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Assisted by R. C. O. MATTHEWS

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THE ECONOMIC JOURNAL

SEPTEMBER 1956

COMPETITION IN TRANSPORT AS AN INSTRUMENT OF POLICY[1]

I

THE economist trained in the classical tradition, as indeed I was, is bound to be attracted by price as the means of distributing resources between the several employments in which they can be occupied. The argument is well known, and the provision of facilities for transport is no exception. The charging of a price effectually discourages all those the urgency of whose demand for the goods or services in question is less than their disinclination to pay that price. Supplies are thus confined to satisfying those wants of greatest urgency; and the more urgent demands, measured by the purchaser's willingness to pay the price, are satisfied before scarce supplies are absorbed in the satisfaction of demands the urgency of which is less. If the urgency of a demand to the individual is any indication of its importance to the community—and to all of us committed to the principle of consumers' choice it cannot be otherwise—distribution by price ensures that scarce supplies go where they are most needed.[2] But demand, to paraphrase Alfred Marshall's famous simile, is one blade only of the scissors. The other is furnished by the cost of production.[3] Price in a competitive market cannot fall permanently below the cost of production. No supplier, deliberately and for long, can afford, nor indeed should he be expected, to work for less than the addition to outlays already incurred including an element for the normal profits of the trade. Competition between suppliers holds prices to the costs at which the particular services can be provided by those already in the trade; and price, where there is free entry for capital and enterprise, cannot rise more than temporarily above the average cost of production except by an amount which depends upon the customer's preference for the one carrier, the absence of any real alternative or ignorance that there is any!

[1] Presidential Address delivered before Section F of the British Association, Sheffield, September 1956.

I have had the advantage, when preparing this paper, of discussions with Dr. Michael Beesley and Mr. A. A. Walters, both of the Faculty of Commerce and Social Science in the University of Birmingham.

[2] The parking of cars (and of other vehicles) on the public highway is at once topical and an excellent illustration of the point. Day and Turvey, *Journal of the Institute of Transport*, July 1954.

[3] Marshall, *Principles of Economics*, 8th Edition, Book V, Chapter III, Section 7.

There is of course, no free access to the transport market. Competition as I have remarked elsewhere [1] though active is neither perfect nor pure as those terms are understood in our professional cant. Nobody but the British Transport Commission may start a new public line of railway, and entry to the trade of road haulage lies within the discretion of the licensing authorities. Only the private carrier is free to run more lorries as he pleases and he, by the terms of his licence, may not carry for others. Transport, as one member of the Commission has told us, is not a commodity which, once produced, can be stored and withheld from sale until there is prospect of a better market. The conveyance of a consignment or a passenger is a service which has to be consumed at the moment of its creation or be lost for ever. A capacity for passengers around the middle of the day, consisting of empty seats on the 12.40 p.m., entirely disappears when the journey is ended. The railway wagon or the carrier's lorry would not be run unless receipts from the consignments it carries at least cover the outlays directly incurred in the journey.

A transport operator, concerned to maintain the service, counts as his costs expenditures laid out in providing for all traders with traffic to consign and fare-payers wanting to travel; but the prices of transport to the buyers are the rates for the consignments and the fares. Neither the one nor the other measures real cost as the amounts of resources consumed by the several purveyors of transport in performing the services the subject of competition. The construction of the lorry and of the bus has to satisfy certain statutory rules and orders. The operations of the carrier must conform with statutory provision and regulation governing speed limits, wages and the hours for which drivers may work. But carriers by road undertake no such legal obligations as the liability imposed on the British Transport Commission to find each year the interest guaranteed by the Treasury upon the stock issued in compensation to railway proprietors. Motor operators do not pay for the use of the road over which their vehicles run, but they are taxed both on the vehicle itself (registration duty) and at 2*s.* 6*d.* on every gallon of fuel they burn. In common with all private business, professional motor carriers have to make both ends meet (and pay their taxes) or go out of business by bankruptcy or otherwise.[2]

Mechanical inland transport on the surface (I know that their omission will be forgiven by any inland waterways men who may be among my audience) is supplied to-day by British Railways and by road motor carriers

[1] See my *Road and Rail* (2nd edition, 1947), p. 26.

[2] The annual proceeds of tax raised upon motor vehicles and upon motor fuel now exceeds by four or five times the sum spent annually upon all highways by all authorities. The proprietors of buses and lorries taken as a class are paying collectively in tax more than the annual expenditure upon the roads which they may be supposed to use. I know of no data drawn from British experience bearing on this point, but I assume that the taxes raised specifically from owners of these heavy vehicles are sufficient at least to recoup any costs to which the highway authorities are put in furnishing the track over which these vehicles are run. See the presumed distribution of taxation raised from the several classes of motor owner prepared by the British Road Federation and reproduced in the current issue of the *Journal of Industrial Economics*, June 1956 (Walker, "Highway Finance").

both privately and publicly owned. The first are controlled by the law and by their own sense of the obligation owed by a great undertaking to a public who have also been their owners since January 1, 1948. The second, excluding the traveller in (and on) the $3\frac{1}{2}$ million private cars and 1 million motor cycles, are governed by a number of Acts of the British Parliament and by those parts of the Transport Act of 1947 as amended by the Transport Acts of 1953 and 1956, which regulate the activities of the British Transport Commission as a carrier of goods and passengers by road. The Transport Act of 1953 has removed the most onerous of the disabilities previously bearing upon the railways. The business of carrying goods by road motor for hire has been reopened to the private owner. For many years I have been an unregenerate upholder of free competition in transport. That principle has now been adopted in the Transport Act of 1953 and the present is an appropriate occasion to examine some of its consequences.

The Transport Tribunal, on the application of the British Transport Commission to confirm a schedule of maximum rates under Clause 20, Section 2, sub-section (*b*), of the Transport Act of 1953, sat for forty-three days in 1955 and 1956. Evidence and argument occupy 947 closely printed folio pages.[1] The Commission propose to base their scales of maximum rates upon the loadability of the merchandise, upon the weight, that is, which can be loaded into a normal 10-ton truck. These maxima are assessed as the sum of the costs to which the railways are likely to be put in carrying a consignment of given weight in adverse circumstances. 5–10% of all traffic by volume, it was estimated, might be carried at these maximum rates. The cost of such traffic was expected on the average to be twice as much. This excess of cost over rate the Commission are willing to absorb. The Commission, following the practice of many another commercial concern, can be expected to issue price lists. In addition, there will be a "great variety of charges" negotiated directly with the trader, at the discretion of the Commission with neither condition nor limitation. The obligation to publish the rates paid for freight has now been repealed. Nothing need be disclosed except the legal maximum, unless the trader is able to claim the protection of the Tribunal under Clause 22.[2]

The Commission are obliged by the Act of 1953 to dispossess themselves of the business of carrying goods by road and they may not now purchase road passenger services except by consent of the Minister. The Act also empowers the Minister to require the Commission to dispose of their present holdings in bus and coach companies if he sees fit.[3] Amended by the

[1] In the Court of the Transport Tribunal: Transport Acts, 1947 and 1953: In the matter of the application of the British Transport Commission (1955, No. 2): To Confirm the British Transport Commission (Railway Merchandise) Charges Scheme. (H.M.S.O.) These proceedings, and especially the evidence of the witnesses for the Commission, are warmly recommended to students of economic policy.

[2] Transport Act, 1953, Clause 20, Section 2 (*d*); Clause 21, Section 1 (*d*); Clause 22 authorises the Tribunal to remedy complaints from traders who allege, successfully, that the railway rate is unreasonable and that their traffic could not reasonably be carried by any other means.

[3] This power has not yet been exercised. I doubt if it will be.

Transport (Disposal of Road Haulage Property) Bill, 1956, the law now permits the British Transport Commission to retain the lorries—about 7,000—required to maintain the trunk network built up by the British Road Services. All services for hire and reward, whether worked by publicly owned undertakings or by private operators, are once more prohibited except under licence.

I add a statement of the total estimated expenditure on transport in all its forms, private and public. The total of national expenditure at factor cost in Great Britain in 1953 was £14,540 million. At that rate current expenditure upon inland transport was of the order of 15%.

The Herbert Committee, reporting on another nationalised industry, were led to remark that " matters of supposed national interest, if they conflict with the economic operation of the industry, should be recognised as essentially political matters to be decided by the Minister subject to his responsibility to Parliament." Earlier they had said that " it is not for the persons running the industry to undertake uneconomic schemes of development within rural or urban areas in the supposed national interest, if the effect is to subsidise one particular body of consumers out of the pockets of others." [1]

The Commission have not concealed the principles on which they propose to make their charges nor have they made any attempt to do so. The price of rail transport in the future, as the Chief Commercial Officer of the British Railways has argued, must reflect—

> " a very great variety of operating conditions such as . . . the weight and loading characteristics of the consignment, the volume and regularity of the traffic and the volume and balance of the traffic over particular routes. All these things are just as familiar to us; but they are not, at the present time, reflected in the structure of our rates sytem in that kind of way. If the railways are to be competitive within their proper sphere and are at the same time to fulfil their duty to pay their way, it seems to me that their charging methods must on the one hand be such as to display a wide measure of elasticity in application, and on the other, they must conform to a general pattern which pays a good deal more regard to the particular character of the operations entailed and the circumstances in which they are performed." [2]

Some averaging of costs between one freight and another of course there must be, by the Commission as by any other large concern, as witnesses for the railway were quick to point out. But there is room no

[1] Committee of Enquiry into Electricity Supply Industry: (Herbert) Report, Cmd. 9672, para. 373.

[2] Question 524. Some of the consequences of permitting competition between railways, compelled by law to charge according to certain statutory (and conventional) principles, and road hauliers, free to make what rates they pleased, have been extensively canvassed in evidence before the Transport Tribunal, particularly by Mr. J. R. Pike (an extract from whose examination in chief is cited in the text), by the Commission in their annual reports and in a paper which I read before this Section when we met in Leicester in 1933. See my contribution in the ECONOMIC JOURNAL of that year.

Gross Expenditure in Great Britain on Road and Rail at Factor Cost and Net of Duplication in 1953 [1]

£000,000.

	Freight.	%.	Passenger.	%.	Total.	%.
1. Transport Industries:						
Rail . . .	299 [2]	26	130 [3]	13	429	20
Road . . .	176 [4]	15	273 [5]	28	449	21
Total . .	475 [6]	41	403	41	878	41
2. Private Transport:						
Road . . .	676	59	579 [7]	59	1,255	59
GRAND TOTAL .	1,151	100	982	100	2,133	100

[1] I am indebted to Mr. A. A. Walters, Lecturer in Statistics, Faculty of Commerce and Social Science in the University of Birmingham, for permission to reproduce this table.

[2] Including collection and delivery by road. Excludes miscellaneous receipts such as demurrage, fees for customs clearance certificates, lavatory takings, etc. Source: *B.T.C. Report and Accounts*, 1953.

[3] Including London Transport (Rail). Excludes shipping services such as cross-Channel passenger ships, etc. Source: *B.T.C. Report and Accounts*, 1953.

[4] B.R.S. gross revenue from carrying operations *plus* an estimate of the expenditure on carriage of goods by "A" licence, "A" contract and 60% of "B" licence vehicles. Source: *B.T.C. Report and Accounts*, 1953.

[5] Includes taxi-cabs, tramways and trolley-buses.

[6] "C" licence, 40% of "B" licence operation and goods-carrying vehicles operated by Government Departments, including Post Office.

[7] Excludes pedal cycles and hackneys.

longer for that wholesale cross-subsidisation [1] of one traffic by another which was (and is) a usual feature of the conventional system of railway rates based on the uniform mileage scale, the classification of goods by value and the prohibition of undue preference. All these elements of equity between traders requiring transport in unlike circumstances will be gone from the rates for railway transport now emerging from the Act of 1953. Should the direct cost by rail be demonstrably higher than the charge at which the traffic could be carried by road, the railway, so we are now informed, may refuse to compete, either by charging a high figure, possibly as much as the maximum or by withdrawing the service entirely. Freight costly to convey is to be found wherever there is irregularity in dispatch, awkwardness of loading and little to bring back, even supposing the merchandise to be consigned over a route otherwise well patronised. Nobody can properly object, though many might be tempted to do so, should he be asked to pay high for freight when direct cost by rail can be shown to be high and there is road carriage to be had at a lower price. But what of those consignments which do not attract the road haulier and are sent to places from which there is no weight of traffic back? There must be whole areas—the rural districts and the remoter regions generally—accepting and receiving a freight so light that no regular service could be expected to pay. The privately owned public carrier by road cannot be asked to

[1] Cross-subsidisation is an apt term popularised by the British Transport Commission to denote that transfer from the more profitable to the less which occurs when services which cost different amounts to provide are charged at the same price.

shoulder an obligation to carry at rates which do not pay nor to places which cannot provide a profitable traffic. Before the Act of 1953 the railways were under a statutory obligation to carry at the appropriate standard and exceptional rate.[1] Now the Commission can point to their statutory undertaking to levy such rates, fares, tolls, dues and other charges "as to ensure that the revenues of the Commission are not less than sufficient for making provision for the meeting of charges properly chargeable to revenue, taking one year with another," [2] and can plead their inability to go on affording facilities for transport except at rates which cover at least the direct costs incurred.

II

The British Transport Commission proposed in 1954 to spend, on their railway, over the next fifteen years, some £1,200 million, a sum just about equal to the figure at which the properties were taken over on nationalisation in 1948. Beesley and Walters [3] have estimated at about 9% the gain the Commission hoped to make; and about half the money is to be raised in the market, where the requirements of the Commission (supported by the Treasury guarantee) will compete with private demands. What is the present cost of the road improvements announced by the Minister to the House in February 1955 is not precisely known (even if the programme were). Experts more knowledgeable than I have attempted their estimates of the probable cost in the large of the congestion and the delays to which traffic is subjected on the Queen's highway. They have arrived at the happy conclusion that the money sunk in a motorway or other considerable improvement by public authorities would be well repaid in the savings enjoyed by the users in time and in the reduced expenses of running their vehicles. It should always be possible, if I may borrow a phrase from the White Paper on Employment Policy of 1944, for a "small central staff" to compare the financial returns expected from the investments projected in railways and in roads—and in waterways and airways for that matter. There is unhappily no "official organisation with the knowledge and reliable information" [4] required for the task. Railways are the responsibility of the British Transport Commission. The returns expected from the £1,200 million now to be sunk appear to have been forecast without

[1] The obligation to charge no more for transport by rail than a certain sum fixed by law, in spite of the considerable variation in the costs of working, has been eased in the past by the closing of a station, the withdrawal of the more expensive passenger service or the abandoning of the line outright when the Consultative Committee, the Tribunal and the Minister could be brought to agree. Such schemes have reached Parliament and, on a recent occasion, drawn a statement from the Minister (537 H.C. 1672). The Commission can and do support their case by figures demonstrating the loss to which they are condemned by the continued provision of the facility, and the opposition can be non-suited, morally at least, when the Commission show, as they so often can, how few of the objectors have recently used the station or the line! British Transport Commission Report, 1955, para. 30, Walker and Maddick "Responsibility for Transport" *Political Quarterly*, 1952.

[2] Transport Act, 1947, Clause 3, Section 4. The obligation was not abrogated by the Transport Act, 1953.

[3] In an article in the *Westminster Bank Review*, May 1955.

[4] Cmd. 6527, para. 81; Cmd. 7046, 1947, para. 12 (*a*).

considering the probable effects of the new rates for freight which the Commission have recently been discussing (or rather refusing to discuss, lest too much be disclosed) before the Transport Tribunal. Investment in trunk-roads is financed by the Exchequer, administered by the Ministry of Transport and undertaken by the 1,286 local highway authorities who do the actual work. Scrutiny of this expenditure, we were told in evidence before a Select Committee of the House of Commons in 1953, has been designed to facilitate oversight by Parliament of public moneys spent by the Ministry and of grants from the Ministry spent by the officers of local authorities. But at no point in this double review is the opportunity taken to consider the improvement of communications by road as a question of policy and the relation of an expenditure upon highways to an investment in the railway. The House of Commons debated plans for the modernisation of railways just six days after they had listened to the Minister announce the expanded road programme. No wonder the member for West Bolton was moved to ask " how the Government proposed to decide whether, financially, its size (the Commission's plan for railway modernisation) was right or whether it is much too big or not nearly big enough." Had the Minister, Mr. Arthur Holt went on to say—

> " been talking to a group of wealthy people who were to be asked to put money into the scheme he (the Minister) would not have convinced us that we should part with our money and give it to the railways. He did not convince us that we would get a good return or even some return or a better return than if we put our money into, say, electricity or roads." [1]

We were encouraged during the 1930s to see in capital outlay the key to an increase in employment and in times of general distress to measure the advantage of investment by the addition which resources used for some non-current purpose could make to the men and machines brought into gainful occupation. Close on half the year's total gross domestic capital formation is to-day in public hands, including therein both public departments and nationalised industries. There is no question now, nor can there have been since the War, of applying the national resources to non-current purposes in order to make work. When in 1956 a scheme of public investment running into millions of pounds a year is decided upon, it can be only because, in the opinion of a body of officials, the condition of the country demands that resources be invested in this particular improvement—or that the central financial authorities are now more reassured about the risks of inflation.

Officials of the Ministry of Transport were satisfied, we were told in 1952, if outlay on highways was kept within 60 or 70% of the total expenditure devoted to that purpose before the War. The £80 million or so being spent on the roads in 1952 amounted to £32 million in 1938 values, and the real

[1] 536 H.C. 1797. " The right honourable gentleman," said Mr. Holt, concluding this part of his speech, " gave no economic reason whatever, but finished his speech by saying the best argument for the proposals was that they were a morale raiser."

resources applied to road maintenance and repair had thus fallen by half since 1938.[1] A much greater expenditure on roads is now contemplated, rising to some hundreds of millions a year if the interested parties get their way. The authorities who lay out funds on the highways are not also the carriers. The costs of an investment in roads are borne by the public. The gains are enjoyed by the users, including the millions of private motorists. In assessing the return to an outlay on highways, there is to be reckoned in addition to the lessened expenditures of those whose costs can be counted, the great satisfactions of motor owners generally. Most of these cannot be valued in pounds, shillings and pence, and many of the beneficiaries being private motorists may not be susceptible to the financial calculus.

III

The charges of the public carrier cannot for long exceed the figure at which the trader might do the job for himself, running his own lorries for the purpose. Owing to the legal restriction which prevents a trader from carrying in his own vans any but his own goods, this cost may rise to a figure representing a haul loaded one way and empty in the other. Transport by road cannot at the other extreme be done at a cost below the normal outlays of a public carrier, one that is, who is licensed to carry for others, and thus has the opportunity of running full both out and home. The costs of carriage by road may be reduced by the construction of motorways and by large (and expensive) improvements to the existing roads.

The rebuilding of a highway will certainly increase the convenience brought by the ownership of a motor vehicle. Much depends upon the nature of the improvement and where it is made. The widening of a congested city street, for example, is more likely to be followed by a reduction in costs than the construction of a new motorway through the countryside, however much a new road free from obstruction may add to the ease of the fast driver.[2] But the private carrier gains, and so does the private motorist. The second will get there quicker and with less frustration. The first will have his goods carried more cheaply and with greater speed and convenience. We need not expect to see similar reductions in the prices which public carriers by road ask for their services. Their costs will be lower, it is true, to the extent which they work over the new and improved highways. They can always be induced to lower their rates following the reduction in their

[1] Fifth Report from the Select Committee on Estimates 1952–53 of Roads; Walker, Beesley and Walters, *Westminster Bank Review*, May 1953, "Transport Policy and Investment in Roads."

[2] The cost of the improvement could be brought home as a price to each user by the charging of a toll. Tolls have this advantage, that the user can be asked to pay a price not less than the worth to him of the highway each time he runs over it. But the raising of a toll, it must always be recognised, diminishes the use that is made of the facility. Nobody who values his purpose at less than the amount of the toll will go upon the toll road, bridge or whatever it may be. The new road is built and the improvement undertaken to ease the flow of traffic. The object should be therefore to get the motorists off the old congested road and on to the new and presumably uncongested motorway. This is done, not by asking a toll on the new road but by a levy upon those who persist in using the old!

costs if other carriers, private and public, are attracted on to the new road and licensed to work over it. An influx of private lorries can no doubt be looked for, owned by those traders who hope to gain from the improvement; but invasion by the lorries of public carriers is limited by discretion of the licensing authorities and the addition of public vehicles working over the new or improved road thus restricted to those "A" licensees who under the law can safely divert their vehicles from other hauls.

The right to run over the public highway is a valuable franchise, and one the worth of which will rise as the condition of that highway is improved. The refusal in these circumstances of a licence to any applicant confers an element of monopoly upon those already fortunate enough to possess them. The monopoly enjoyed by the holder of an "A" licence is limited by the costs and convenience of the trader who works or who may work his own vans; and it depends upon the licensing authorities, who have full power in their discretion to grant or refuse applications for public "A" and limited "B" carriers' licences. This power is exercised in the manner prescribed by the Act and interpreted by the Rail and Road Traffic Appeal Tribunal and their successors, the Transport Tribunal. Hauliers granted an "A" licence are free in law to ply their trade anywhere and in any part of the country. But the Act of 1933 includes the previous conduct of the holder of the licence among the considerations which should guide the licensing authority, and they may now take into account, under clause 9 of the Act of 1953, the relative prices which are asked for the facilities applied for. Their discretion has thus been enlarged. What use will be made of the enlargement one cannot yet say, for the addition has not yet been tested; but the conduct of the licensee has in the past been held to warrant the refusal of an application for renewal on the grounds that a licence sought in one area has been used in another. Public "A" and limited "B" licences alone are subject to the discretion of the licensing authority. The private "C" carriers licences shall be granted unless the applicant is the holder of a licence which has been suspended or has been revoked. Licences can be revoked or suspended on the ground that any of the conditions of the licence have not been complied with. The Minister has included a clause in the Road Traffic Bill now before Parliament empowering licensing authorities to suspend or revoke "A" and "B" licences should they be satisfied that the licensee has been "persistently charging" for carriage by road "sums insufficient to meet the cost of rendering those services, and has thereby placed other holders of licences at an undue or unfair disadvantage in competing with him as respects the carriage of goods by road." [1] These provisions, besides opening the way to the exercise of forensic skill, may impose upon the licensing authority, if unwisely interpreted, some part of the responsibility for managing the carrier's business. Licensing authorities are already invited, on the applications before them, to decide whether or not the case has been made for adding to the public facilities for transport. They can now consider the rates proposed by applicants. Should

[1] Clause 35, Section 1.

this clause stand part of the Bill when it comes back from the Lords, they and their staffs may also be required to review the costs at which business is being done. Who in these circumstances, one is tempted to ask, is the carrier —the man who sets the rate or the authority who determines that the price is insufficient to cover all the outgoings? These powers will certainly limit still further the competition offered by public carriers licensed to run over the public road; and administrative officers forced to embrace so onerous a liability are not perhaps to be envied.

Consideration of the cost at which carriage can be afforded by rail and road may not be the most important of the factors dominating competition between them. Comparisons of cost, however elaborate, even of marginal cost, supposing always that a meaning can be attached to that term in the context of a consignment of freight or of a passenger, do not get us very far. Nothing is to be gained, as I had thought earlier,[1] in the pursuit of some chimerical notions of " fair " competition between road and rail, particularly when railways are required by law to pay compensation upon a past investment and motor hauliers privileged to work over the public road. It was, I believe, Immanuel Kant who remarked that the better part of wisdom is to know what questions may properly be asked. May I commend that conclusion to my audience and ask them to devote their attention instead to the question more significant to competition between carriers by road and rail, of the issue of motor road carriers' licences, public, limited and private, by those twelve good men and true with two added for Scotland, the licensing authorities?

GILBERT WALKER

Faculty of Commerce and Social Science,
University of Birmingham.

[1] See my study of transport in Nova Scotia in the *Reports of the Nova Scotia Economic Council*, Vol. VI, No. 48, particularly pp. 74–86 (Queen's Printer: Halifax, N.S., Canada, 1942).

MEASURABLE UTILITY AND PROBABILITY— A SIMPLIFIED RENDERING

THE modern version of measurable utility is a part of a theory of human behaviour in the conditions of risk. Its consistency with certain basic axioms has been the subject of an extensive discussion on a high technical level.[1] The present note has hardly anything to add to this discussion and is not meant to be on a high technical level. Written by a non-specialist, it can serve no other purpose than to help a fellow non-specialist to see the wood without bothering about the trees. The stress is laid on easy reading, even if it means missing some finer points.

THE HYPOTHESIS OF MORAL EXPECTATION

The main hypothesis of the theory with which the present note is concerned is that in the conditions of risk people behave *as if* they were maximising mathematical expectation of utility, Bernoulli's moral expectation. The condition "as if" is important, because in choosing between alternative courses of action in the conditions of risk people are not supposed to make all the calculations explained in the following paragraphs; no more than in estimating the distance of an object are they supposed to calculate the size of the triangle formed by the object and the eyes, although they behave as if they were doing this.

The following example may help to explain what is meant by moral expectation as the principle governing behaviour in the conditions of risk. Suppose that an individual has to choose between two alternative acts. One is to buy a bicycle; the other is to buy a lottery ticket with a chance of 50 : 50 to win a motor car or nothing. Suppose also that the price of the bicycle is just equal to the price of the lottery ticket, and that there is no other way of using money; our individual must have either the bicycle or the lottery ticket. What will he choose?

If we accept the hypothesis that the individual is maximising mathematical expectation of utility, the answer is given by the following calculation. Suppose that the numerical measure of utility of the motor car is 1, the

[1] Besides von Neumann and Morgenstern's *Theory of Games*, (2nd ed., pp. 15–31 and 617–32) the articles most often quoted are: M. Friedman and L. J. Savage, "The Utility Analysis of Choice Involving Risk," *The Journal of Political Economy*, 1948; J. Marschak, "Rational Behaviour, Uncertain Prospects, and Measurable Utility," *Econometrica*, 1950; and P. A. Samuelson, "Probability, Utility and the Independence Axiom," *Econometrica*, 1952. A. A. Alchian ("The Meaning of Utility Measurement," *American Economic Review*, 1953) and R. H. Strotz ("Cardinal Utility" in *Papers and Proceedings, American Economic Review*, 1953) are moving on a less formal plane. Professor Georgescu-Roegen in his article "Choice, Expectations, and Measurability," *Quarterly Journal of Economics*, 1954, gives a list of other references. The item which must be added to this list is the relevant chapter in Professor R. G. D. Allen's forthcoming book, which I have had the privilege of reading before its publication.

measure of utility of the bicycle is 0·3, and of nothing is zero. The moral expectation of the lottery ticket with a chance of 50 : 50 (*i.e.*, 0·5 : 0·5) to win the motor car or nothing is then $1 \times 0{\cdot}5 + 0 \times 0{\cdot}5 = 0{\cdot}5$. This is more than the numerical value of utility of the bicycle (0·3). Thus according to the hypothesis of moral expectation our individual will choose the lottery ticket. If utility of the bicycle were greater than 0·5, or if the chance of winning the motor car were less than 0·3 : 0·7, the individual would choose the bicycle.

The same argument may be applied to more complex situations. A lottery ticket may stand for any course of action involving risk, and our individual may have to choose between more than two alternatives. Also the prizes to be won (two or more of them) may themselves be in the nature of lottery tickets. One of the alternatives may be, for instance, to invest money in a certain plot of land with a chance to strike oil there. Oil may be a source of income, provided that it is not displaced by some other type of fuel. If in the case like this utility of the expected income is 1, the probability of oil being displaced by some other type of fuel is 0·2 and the probability that oil will be struck is 0·5, the mathematical expectation of utility of the oil is $1 \times 0{\cdot}8 + 0 \times 0{\cdot}2 = 0{\cdot}8$, and the mathematical expectation of utility of the plot of land is $0{\cdot}8 \times 0{\cdot}5 + 0 \times 0{\cdot}5 = 0{\cdot}4$. According to whether it is greater or less than the mathematical expectation of utility of alternative investments, our individual will, or will not, buy the land.

If this theory is to have any meaning, a satisfactory answer must be given to the following questions: (1) what significance is to be attached to numerical measures of utility and how can they be ascertained, and (2) what significance is to be attached to, and how can we ascertain, the numerical measures of probability? These two questions are the subject-matter of the main part of this note. The last three sections deal with the logical consistency of the theory and with its empirical verification.

Intuitive Measures of Utility

There is one point about utility we may agree upon at once. Utility is like temperature; to be measured it must be referred to a scale of arbitrary units and an arbitrary origin. To measure temperature we may use Fahrenheit, Centigrade or Réaumur scale. The same applies to utility. To measure it we must first have a scale to which it is to be referred.

The scale must be fixed with reference to the individual in whose behaviour we are interested. The origin of the scale may be, for instance, at the position in which this particular individual has not yet either the bicycle or the motor car. In this position his utility is said to be zero. The unit of the scale may be fixed by attaching the value of unity to utility derived by him from the possession of the motor car in addition to what he has got in the zero position. The problem is then to attach numerical measures to utilities derived by this individual from other combinations of goods, such, for instance, as the goods he has got in the zero position plus a bicycle instead of the motor car.

One way of solving the problem may seem to be simply to inform the individual of the positions we have chosen for zero and unity, and to ask him to determine the numerical value of utility of the bicycle combination by intuition. Such a straightforward method, however, cannot be accepted for at least two reasons. One is that it is generally believed that our intuition does not go so far as to make such an intuitive measurement possible; we can *rank* utilities in the sense that we can say that we prefer the motor car to the bicycle, but we cannot say by how much or how many times we prefer it. The other reason is that even if somebody would think that he is able to attach numerical values to utilities by intuition, this would not be the same thing as measuring them; it would be simply to make a guess, not confirmed by any observable phenomena and not verifiable by any sort of test or experiment.

The Jevonsian Method

The method described in this section corresponds more or less to Jevons' views on utility.[1] It is based on the belief that we can rank not only utilities but also differences in utilities.[2] To quote Professor Robbins' example,[3] it is believed to be possible to say not only that we prefer a particular Rembrandt to a particular Holbein and the Holbein to a Munnings, but also that our preference of the Rembrandt over the Holbein is less than that of the Holbein over the Munnings. If this is true, then it is possible to attach numerical values to utilities without any further appeal to intuition.

Suppose that in our former example the individual finds his preference for the motor car over the bicycle greater than that of the bicycle over nothing (the motor car, the bicycle and nothing being in addition to what he has got in the zero position). This means that if utility of nothing is zero and utility of the motor car is unity, utility of the bicycle must be something between zero and 0·5. There must be, however, a good which is exactly in the middle between the motor car and nothing, the individual's preference of this good over nothing being exactly the same as his preference of the motor car over it. Utility of this good is 0·5. We may further find a good which is exactly in the middle between zero and 0·5, its utility being 0·25. If the individual prefers the bicycle to this latter good, utility of the bicycle is now between 0·25 and 0·5. Proceeding in this way, we can make the limits on either side of the bicycle move closer and closer, and determine the latter's utility with as much accuracy as we like.

The Jevonsian method does not require any intuitive measurement of either utilities or the differences in them. It requires only the ability to rank the differences, the ability to say that we prefer one good to some other more, exactly as much or less than we prefer the latter to yet another good.

[1] See D. Ellsberg's paper "Classic and Current Notions of Measurable Utility," Economic Journal, 1954.

[2] The term "differences in utilities" is used in the sense of differences of distance (see C. Kennedy, "Concerning Utility," *Economica*, 1953).

[3] "Robertson on Utility and Scope," *Economica*, 1953. See also Professor Hicks' comment in "Robbins on Robertson on Utility," *Economica*, 1954.

Whether we possess such ability is a question open to dispute. But even if we believe that we do, we must bear in mind that there is an important difference between the ranking of utilities and the ranking of the differences in them. The former may correspond to certain acts which can be observed and tested. We may, for instance, let our individual choose between the motor car and the bicycle, and conclude that utility of the alternative chosen is greater to him than utility of the alternative forgone. If the individual refrains from making the choice and does not mind if it is made for him by somebody else, he may be described as being indifferent; the two utilities rank equally high to him. If, however, he is asked to rank differences in utilities, this principle does not apply, because it is impossible to choose between the addition of a bicycle to what we possess now and the addition of a motor car less the bicycle (the exchange of the bicycle for the motor car) after we have got the bicycle. It does not make sense to speak of such a choice because it is impossible to choose the second alternative without having previously obtained the first. Ranking of differences in utility requires the ability to project oneself in two different situations, one before having got the bicycle and one after having got it; and as in fact nobody can be in two situations at the same time, the ranking cannot be verified by experiment or observation. The Jevonsian method is not a scientific operation, at least not in the modern sense of this word.

The fact that ranking of differences in utility cannot be verified by observation does not mean that it does not make sense to speak of them. On the ground of past experience, and using our powers of imagination, we often make a sort of mental picture of how we would feel about certain things in certain hypothetical situations; about having the Rembrandt instead of the Holbein if we had the Holbein already, or about having a motor car instead of a bicycle if we had the bicycle. And there is nothing nonsensical in making comparisons between such imaginary feelings. The only point is that a mental picture of how we would feel in a hypothetical situation is not the same thing as the actual feeling when the hypothetical situation becomes real. The point is that not only may it not be correct, but also that it is a different thing. If we say that we rank our preference of the Rembrandt over the Holbein lower than that of the Holbein over the Munnings, we rank in fact not our actual preferences but only the mental pictures we form of them.[1]

Von Neumann and Morgenstern's Operation

Suppose that as in the first section of this note, an individual has to choose between a bicycle and a lottery ticket with the 50 : 50 chance of winning a motor car or nothing. If he prefers the lottery ticket and his utility scale is adjusted so that zero corresponds to winning nothing and unity to the motor car, we conclude that utility of the bicycle is to him less than 0·5. His choice between the bicycle and the lottery ticket depends on the degree of

[1] On the dependence of the kind of utility we measure upon the operation by means of which we measure it see also Ellsberg's article, *op. cit.*

probability of winning the motor car. If by changing the rules of the lottery we reduce the chance of winning it, we make the lottery ticket less attractive. We may, therefore, adjust the chances so as to make the individual indifferent between the lottery ticket and the bicycle. Suppose that this happens when the chance of winning the motor car is 0·3. According to the hypothesis of moral expectation the utility of the lottery ticket is then $1 \times 0{\cdot}3 + 0 \times 0{\cdot}7 = 0{\cdot}3$, and as the individual is indifferent between the lottery ticket and the bicycle, utility of the latter is also 0·3.

This is what we understand by von Neumann and Morgenstern's operation of measuring utility.[1] It does not make any other requirements on our intuition than the ability to rank the alternatives between which we may be asked to choose. Unlike the Jevonsian method, it may be tested, in principle at least, by observation or experiment; we may ask people to choose between alternatives involving risk.

There is, however, one point which requires further consideration. In order to be able to measure utility we must first measure probability. We must be able to attach some significance to the number 0·5 or 0·3 as a measure of probability, and we must be able to determine it. In the majority of writings on behaviour in the conditions of risk the question whether we are able to do it was either not asked at all or it was dealt with in a very arbitrary manner.[2] The bulk of the theory was developed without bothering much about how to measure probability. It was simply taken for granted that its measurement was possible and that there was a meaning in such statements as, for instance, that the probability of oil being discovered under a certain plot of land was 5 to 10, *i.e.*, 0·5. The following sections deal with certain difficulties involved in this attitude and explain an attempt at getting rid of them.

Personal Probability

Von Neumann and Morgenstern's argument was based on the measure of probability as frequency in the long run. This means that if, for instance, the lottery is a toss of a coin, heads being the motor car, tails being nothing, the probability of winning the motor car is for our individual 0·5. If the lottery is based on drawing a number out of ten, the numbers one to three being a win, the numbers four to ten being a loss, the probability of a win is 0·3, etc.

It must, however, be borne in mind that frequency distribution in the long run is the proportion of the number of wins or losses to the number of trials, *the number of trials approaching infinity*. If there is one trial only, that is to

[1] However, the credit for priority must be given to F. P. Ramsey, who had thought it out already in 1926. (See his *Foundations of Statistics*, 1931.)

[2] Samuelson, in the article mentioned before (*op. cit.*, p. 671), says that to simplify the exposition he assumes without discussion that the primitive notion of numerical probability is "well defined and applicable to our consumer." Von Neumann and Morgenstern's argument is based explicitly on the interpretation of probability as frequency in the long run (*Theory of Games*, 2nd ed., p. 19). In Marschak's paper (*op. cit.*) the question of whether probability is measurable or not has not been raised at all. The same applies to Alchian and Strotz (*op. cit.*).

say, if there is one lottery ticket or a unique decision, frequency distribution has no meaning at all. To regard it as a measure of the probability *with which one expects to be a winner in this particular case* is a very arbitrary procedure. We may have a hunch that this time it will be heads, and we may feel so strongly about it that we may regard the possibility of winning the motor car as nearly a certainty, in spite of the fact that the objective chances are only 50 : 50. And it is this feeling of certainty, the personal, subjective probability, that governs our behaviour.

This has a bearing on the determination of the numerical values of utility. Suppose that in the example mentioned above we want to determine the numerical value of utility of the bicycle by means of von Neumann and Morgenstern's operation. This means that we have to make the numerical value of the probability of winning the motor car so great as to make the individual indifferent as to whether he has the bicycle or the lottery ticket. But if the probability is subjective, there seems to be no other way to ascertain it than to ask him how he feels about it. In other words, we must ask him to attach a number to his feeling of uncertainty which would make him indifferent between the bicycle and a chance of having the motor car. And this, in principle, is the same problem as to attach numbers to utilities. It is impossible to attach to either of them any numerical measures by intuition.

In order to measure utilities by means of von Neumann and Morgenstern's operation it is thus necessary to devise an operation which would permit us to measure subjective probability. The first solution of this problem was given again by Ramsey as far back as 1926. Savage's development of some of the ideas put forward by de Finetti has been the most recent attempt to formulate a theory of probability as an integral part of the theory of human behaviour in the conditions of risk.[1]

Measurability of Probability

The present section is based on Savage's analysis of quantitative personal probability, but it is not a summary of it. It is rather in the nature of a paraphrase, the purpose being to explain the rules of an operation by means of which it is possible to get rid of the difficulties mentioned at the end of the previous section.

The first steps are very similar to those of the Jevonsian method of measuring utility. First we have to fix the scale. If we are absolutely certain that an event will not take place (for instance, that we will not strike oil on a certain plot of land), we say that its probability is zero. If we are absolutely certain that it will take place, we say that its probability is unity. If we are uncertain as to whether it will take place or not, its probability to us is something between zero and unity.

Now by means of the following device it is possible to split the distance between zero and unity into halves and to find an event the probability of

[1] L. S. Savage, *The Foundations of Statistics*, 1954; B. de Finetti, " La prévision, ses lois logiques ses sources objectives," *Annales de l'Institut Henri Poincaré*, 1937.

which (subjective) is 0·5. Suppose that we toss a coin and offer a prize for the right guess of the result. If the individual in whose subjective measures of probability we are interested says that he expects heads, this means that heads is more probable to him than tails. If he says tails, tails is more probable. But if he does not insist on either heads or tails and does not mind if the guess is made for him by somebody else, heads and tails are equally probable to him, and the probability of either of them is 0·5.

As we are speaking not of frequency distribution but of subjective probabilities, we must not rule out the first two possibilities; our individual may be prejudiced in favour of one of the results. In this case we must modify the rules of the game in the following way. Let the coin be tossed not once but, for instance, three times. This means that we have $2^3 = 8$ different sequences of heads and tails. Four of them begin with heads and four with tails. The probability that one (any one) of the first four comes out is thus the same as the probability of heads on the first toss, and the probability that one (any one) of the other four comes out is the same as the probability of tails on the first toss. If now our individual is prejudiced in favour of heads on the first toss, the former probability is greater to him than the latter.

In this case, however, we may group the eight sequences in a different way. Only three of those beginning with heads may form the first group, and the remaining five (those beginning with tails and the remaining one beginning with heads) the second group. The probability that one of the sequences of the first group comes out is then less than the probability of heads coming out on the first toss, and the probability that one of the sequences belonging to the second group comes out is greater than the probability of tails on the first toss. If, therefore, our individual is prejudiced in favour of heads on the first toss, he may be indifferent between the alternatives of the first and the second group. If he is not, we must increase the number of tosses. As it can be made as great as we please, we may always arrive at such a great number of sequences that it is possible to achieve a very fine balancing of the probabilities of the two groups formed of them. And then we say that the probability that one of the sequences belonging to one of the two groups comes out is to our individual 0·5. As the probabilities are subjective, the number of sequences may not be the same in both groups.

In spite of certain similarities between the first steps of this operation and the Jevonsian method of splitting the differences in utilities, there is an important difference of principle between the two. In the former the individual is asked to rank alternatives which are both available to him; he may choose one group of sequences as more probable than the other, and he may put his stake on whichever group he likes. In the Jevonsian method the individual is asked to rank alternatives one of them not being available unless the other has been chosen. Even, therefore, if one decides to reject the Jevonsian method of ranking differences in utilities on the ground of its having no operational meaning, the ranking of subjective probabilities is acceptable.

The next step in measuring subjective probabilities is to compare the

probability of one of the sequences of heads and tails, belonging to one of the two groups, both equally probable, with the probability of such an event as, for instance, striking oil on a certain plot of land. If our individual thinks that the latter is more probable, we say that its probability to him is greater than 0·5; if it is less probable, its probability is less than 0·5.

In order to arrive at the exact measure of the probability of this particular event we must split the distance between zero and unity not in two but in a much greater number of alternatives, all equally probable to the individual in question. The procedure may be the same as in the former case. We may contemplate a certain number of tosses of a coin, leading to a certain number of sequences of heads and tails, and then combine the sequences into groups in such a way as to make the groups equally probable to our individual. As we are concerned with subjective probabilities, the groups need not each contain the same number of sequences; and as there is no limit to the number of possible tosses, we may have as many groups as we like. The probability measures attached to each of them is then the corresponding fraction of unity. These numerical measures of subjective probabilities are then amenable to the same mathematical operations as frequency distributions. Thus if we have, for instance, 100 groups, the probability measure of each of them being 0·01, the measure of the probability that one of the sequences belonging to 30 groups comes out is 0·3. The distance between zero and unity is divided into 100 equivalent parts in the same way as 1 metre is divided into 100 centimetres or 1 yard into 36 inches.

The procedure also serves the same purpose. We measure the probability of a certain event by relating it to the probability that one (any one) of the sequences belonging to a certain number of groups comes out, exactly in the same way as we measure the length of an object by relating it to a certain number of centimetres or inches. If, for instance, our individual thinks that the probability of oil being discovered under a certain plot of land is the same as the probability of one of the sequences belonging to 30 groups (from 100) coming out, its numerical measure is 0·3. A greater precision can be obtained by dividing the distance between zero and unity not into 100 but into 1,000 groups, as we divide 1 metre into 1,000 millimetres. As the number of tosses and of possible sequences of heads and tails is unlimited, the number of equivalent groups can be made as great as we please, and *in principle* we may achieve any degree of precision.

The Logical Consistency of the Theory

The outcome of the above discussion is that by means of the operation described in the previous section we can attach numerical values to subjective probabilities, and then by means of von Neumann and Morgenstern's operation we can attach numerical values to utilities. Both operations refer to facts which can be observed and tested, and they provide us with all the data we need to calculate mathematical expectations of utility of various acts involving risk. An example of such acts may be to buy a lottery ticket

with a chance of winning a motor car or to invest money in a plot of land in the expectation of striking oil there. Thus the hypothesis that in the conditions of risk an individual behaves as if he were maximising mathematical expectation of utility (moral expectation) provides us with a theory of his behaviour which is operationally meaningful; it refers to observable facts and can be tested by experiment. The question which remains to be settled is only whether it is also logically consistent.

In what sense could it be inconsistent? Suppose that as the first step in the calculation of mathematical expectation of utility we want to attach numerical values to the utilities of four alternatives: (1) to a motor car (in addition to what the individual under investigation has got in the initial position); (2) to a bicycle (in addition to what he has got in the initial position); (3) to a motor cycle (in addition to what he has got in the initial position), and (4) to what he has got in the initial position without any additions. According to the procedure explained before, we fix the origin of the scale at the last alternative, unity at the first, and we determine the utility of the motor cycle by asking our individual to choose between the motor cycle and a lottery ticket with a chance of winning the motor car. If the rules of the lottery are so adjusted that with the resulting subjective probability of winning the motor car our individual is indifferent between these two alternatives, the mathematical expectation of utility of the lottery ticket is the numerical measure of the utility of the motor cycle.

So far the procedure is unambiguous, and there is no place for any logical inconsistency. Suppose, however, that as the next step we want to attach a numerical value to the utility of the bicycle alternative. One way to do it is to ask our individual to choose between the bicycle and a lottery ticket with a chance of winning the motor car. But as we know already the numerical value of utility of the motor cycle, we may also ask him to choose between the bicycle and a lottery ticket with a chance of winning the motor cycle. The point now is whether these two ways lead to the same result. If they do not, the mathematical expectations of utility derived from them may be different too, and our theory is inconsistent; according to which way we choose, we may arrive at different predictions of behaviour in the same conditions.

Most of the technical literature on moral expectation deals with this question of consistency. Its outcome is that if we accept certain axiomatic restrictions on our preferences, such, for instance, as that the individual is not choosing the lottery ticket for the sake of the pleasure of taking part in the game, the theory must be logically consistent; whichever way we choose to ascertain numerical values of utilities, they must yield the same results. This is what is meant by utility measures being uniquely determined up to the linear transformation, *i.e.*, up to the arbitrary units and the origin of the scale. If, instead of choosing as zero and unity the utilities of the initial collection of goods and of the initial collection of goods plus the motor car, we had chosen the utilities of some other collections of goods, the numerical scale of utilities would be different. As long, however, as we stick to a certain origin and arbitrary units, it does not matter what a combination of

prizes we choose for the lottery ticket; all of them must lead to the same utility measure.

In this non-specialist note no attempt is made to reproduce either the axioms put forward by various writers or the logic of the deductions derived from them. It must suffice to point out the sense of these deductions. And this is that if an individual's system of preferences satisfies the conditions implied by axioms which are easily acceptable to most of us by intuition, his numerical measures of utilities are uniquely determined up to the arbitrary units and the origin of the scale, and the theory of moral expectation is logically consistent.

Empirical Verification and Rationality

The theory of moral expectation satisfies all the conditions of a scientific theory in the modern sense of this word; it implies operations the result of which can be ascertained by experiment or observation,[1] and it is logically consistent. What remains to be done is only to put it to a test by means of an empirical study.

An attempt at such empirical verification was made by Mosteller and Nogee,[2] who performed an experiment on a number of people taken from undergraduates at Harvard College and from a regiment of Massachusetts National Guard. The participants were asked to play a game devised specially for this purpose. On the ground of the results the authors came to the conclusion that " the notion that people behave in such a way as to maximise their expected utility is not unreasonable." [3] The predictions of behaviour based on the data established in the experiment were " not so good as might be hoped," [4] but their general direction was correct.

The experiment was based not on personal probability but on frequency distribution. As, however, each person was taking part in a game consisting of a great number of " trials," it is unlikely that this might have affected the results much. There is no doubt that for some persons they were negative. The question, therefore, arises how we must interpret these negative cases.

Two answers suggest themselves at once. One is that the particular individual's system of preferences does not satisfy the conditions implied in the axioms; the other is that this particular individual does not behave according to the hypothesis of moral expectation. In either case the theory is thus wrong in the sense that it does not apply to the individual in question.

There is, however, a third answer, put forward by Professor Marschak.[5] The theory of moral expectation may also be interpreted as being of a normative character; a person *does* not so much behave as he *should* behave according to it. Otherwise he would not behave rationally.

[1] It has been pointed out to me by Professor R. G. D. Allen that an individual may behave differently if he is being observed than if he is not, because if he knows that he is being observed, he may take into account the utility he derives from the effect his behaviour has on the people who are observing him.

[2] " An Experimental Measurement of Utility," *The Journal of Political Economy*, 1951.

[3] *Op. cit.*, p. 403. [4] *Op. cit.*, p. 399. [5] *Op. cit.*

The point may be explained by means of the following analogy. If a man is walking to work every morning it is a reasonable hypothesis that, other things being equal, he takes the shortest route. None the less, it may happen that he may make a mistake; he may think on the ground of an intuitive impression that a particular route is shorter than some other, although in fact the opposite is true. If, however, somebody shows him on a plan that his impression is wrong, he should admit the mistake and take the other route, the truly shorter one.

The same may apply to behaviour in conditions of risk. An individual may choose an alternative with a lower moral expectation simply because he is acting on the ground of an intuitive judgment; he would behave differently if the calculus of moral expectation were explained to him. If he would not, that is to say, if he persisted in choosing the alternative with a lower moral expectation, this would mean that he behaves irrationally.

If we accept Marschak's approach there is no point in any empirical verification of the theory. In fact, it ceases to be a theory of human behaviour at all. The calculus of moral expectation becomes rather a principle of rational behaviour, like strict calculation in business; and an empirical study of the type described above is then a test not of the applicability of the theory but of the rationality of the behaviour of the individuals participating in it.

Is Utility Measurable?

The possibility of irrational behaviour casts some doubts on the value of von Neumann and Morgenstern's operation as a method of measuring utility. For if the behaviour of the individual under investigation happens to be irrational, the measures of utility arrived at in different tests are not the same, and it is impossible to say which of them is to be regarded as the true one.

Suppose, however, that the irrationality of the individual's behaviour is explained to him, and that he is prepared to modify it so as to make the measures of utility absolutely consistent. Can we then say that we have solved the problem of measuring utility, and that utility has become cardinal again?

The answer depends on what we understand by utility, and the analogy with temperature may again be of help in clarifying the point. We know that we cannot measure temperature by hand because we cannot measure the intensity of the feelings we experience when we touch cold or hot objects. We can measure it if we use a thermometer; then, however, what we measure is not our experience of hot or cold, but a change in the volume of mercury (or some other stuff) in the thermometer. It is true that both the change in the volume of mercury and the experience of hot or cold are due to the same cause: to a movement of molecules in the stuff the temperature of which we try to measure. But they are not the same thing, and the temperature shown on a thermometer is not the measure of the intensity of our feelings. In fact, if we could measure the intensity of our feelings of hot or cold, the

relation between them and the temperature of the object we touch would no doubt be an interesting subject for study in psychology.

Utility which we measure by means of von Neumann and Morgenstern's operation is like temperature. It may be defined (and this is no doubt the original meaning of the word) not as satisfaction, welfare or happiness, but as a certain property of goods which makes them desirable to us. There is no single cause of utility, such as the movement of molecules is supposed to be the cause of high temperatures, and the same physical characteristics of goods may make them more desirable to some people and less to others. None the less, if we interpret utility as a sort of a general assessment of those characteristics from the point of view of their making the goods more or less desirable to a particular person, we can speak of measurable utility in the von Neumann and Morgenstern sense.

Utility as welfare, happiness or satisfaction corresponds to our feelings of hot or cold when we touch hot or cold objects. There is nothing in the axioms of the theory of moral expectation that would suggest either identity or any linear relation between the utility measures they imply and the feelings of welfare, happiness or satisfaction we derive from consuming or possessing goods. All we need for the axioms to be intuitively acceptable is that their utility measures are consistent with our ranking of various combinations of goods as more or as less desirable to us. But the pleasure, welfare or satisfaction we derive from them is not measurable; utility in this sense must still remain ordinal.

S. A. Ozga

London School of Economics and Political Science.

WAGE POLICY AND A LABOUR STANDARD

In recent years the general level of wages has attracted growing attention in Britain and other countries because of its importance as a factor in inflation, and in problems of balance of payments and monetary standards. Indeed, the claim is sometimes made that we are no longer on a gold standard or a Government-managed currency standard but on a labour standard dominated by the trade-union movement.[1]

Monetary conditions to-day differ greatly from those before 1914, when the gold standard was in operation and provided the basis for currency values and for regulating the economy. Then, values were related to a single commodity. It was a period of *laissez-faire*, with minimum intervention by Government in economic affairs, and the trade-union movement was relatively weak. If labour costs became too high and the balance of payments became unfavourable because of falling exports, credit was restricted, gold might have to be exported, unemployment grew and wages declined until the strain on the economy was removed. To-day, by contrast, the era of *laissez-faire* is over, and the Government assumes wide responsibilities for economic conditions, including the maintenance, as far as practicable, of a high stable level of employment. Also the powers of the Government and its experience in economic affairs are now much greater than they were two or three generations ago. The trade-union movement is strong, and the determination of wages by collective bargaining is widespread. Instead of monetary standards determining the general level of money wages, it is claimed that the price level and the foreign-exchange value of the currency have now to adjust themselves to a wage (labour) standard.[2]

The operation of a labour standard is based on the assumption that the aim of government policy will be to ensure full employment in all circumstances. Whatever the wage level may be, the supply of labour will not be allowed to exceed demand, and the ordinary adjustments of demand for and supply of labour would no longer determine wages. If this aim is realised, then, whatever the wage level, either selling prices will yield such profits that private industry will provide full employment or the Government must do so directly by increasing its own demand for labour or indirectly by subsidising private industry. These conditions would place the trade unions, perhaps in

[1] In a Memorandum on Wage-fixing According to the Price Index, Jørgen Pedersen says, "An arrangement which leaves wage-fixing entirely to the organisations of the labour market in fact gives these organisations sovereign control over the development of the monetary system" (*International Economic Papers*, No. 4, 1954, p. 106).

In his Presidential Address to Section F of the British Association's meeting in Bristol, September 1955, Professor Hicks said: "Since 1931, wages questions have been closely associated with monetary questions; it is even true that the *general* level of wages has become a monetary question. . . . It is hardly an exaggeration to say that instead of being on a Gold Standard, we are on a Labour Standard" (Economic Journal, Vol. LXV, September 1955, p. 391).

[2] This might, in a sense, be regarded as an application in a special field of a labour theory of value.

collusion with employers, in a position to push wages successively higher. Money wages would be rigid against a fall, but would almost certainly move persistently upwards, with inflationary consequences. This would be mainly because, released from the necessity to take unemployment into account, the trade unions in exercising their essential function of getting what they conceived to be the best terms for their members would apply continuous pressure for higher money wages.[1] The effects of trade-union pressure would be aggravated by wage increases caused by competition for labour by employers. The Government would increase the supply of money to meet the needs of rising costs and prices. As soon as costs of production rose above those in competing countries abroad, exports would fall, the balance of payments would become adverse, the gold reserve would be drained and, finally, the foreign-exchange rate of the currency would fall.[2] In effect, money values would adjust themselves to wages and not wages to money values. Full employment would be maintained whatever happened to the price level, the balance of payments and the rates of foreign exchange.

If the objective of maintaining a high stable level of employment is achieved and if, in a pluralistic society, freedom to fix wages is retained by trade unions and employers' organisations supplemented by wage councils and arbitration tribunals independent of Government control, then inflation can be avoided and stable exchange rates ensured only if these bodies show a sufficient sense of responsibility and regard for the public interest. But if this sense of responsibility is not shown and the economic interests of the country are endangered by a rapidly rising price level and depreciating exchange rates, can the Government abdicate its authority over monetary policy and standards? In a pluralistic democracy many important functions are exercised by voluntary unofficial bodies. In Britain and many other democratic countries it is widely accepted, with some qualifications, that employers and trade unions are the most suitable instruments for wage regulation. For the Government, however, to approve or acquiesce in their exercising this function, it must be satisfied either that the balance of forces between these two groups will ensure that the resulting wage standards will be appropriate in the interests of the economy as a whole, of which they together form so large a part, or that in their negotiations and agreements they do not neglect these wider interests. But if these results are not realised, the Government cannot relinquish its responsibilities. It cannot attempt to

[1] This pressure would be greatest where each union is autonomous in its wage policy and negotiations, but where the Trades Union Congress or similar central bodies in other countries exercise influence on their affiliated unions and account is taken of the common interests of workpeople in all industries, the wage policy might be sounder and more restrained. In some post-war years the central trade-union bodies in Scandinavian Countries and the T.U.C. in Britain have, in varying degrees, been influential in this way.

[2] Weakness of the exchange rates would be increased if wage trends in relation to productivity gave competing countries advantages in foreign markets or if the terms of trade became unfavourable. Where exchange rates are liable to change the main alternatives are free exchanges which adjust themselves continuously to variations in the demand for and supply of the currency, and fixed rates, but with the probability of considerable changes at intervals, with the uncertainties and dislocations to trade which such changes would cause.

ensure full employment if the trade unions pursue irresponsible wage policies. It must try to prevent a sound monetary policy from being undermined by sectional interests, it must use its power and influence as an impartial authority to restrain such interests from injuring the country's economy, and must adopt credit, fiscal and other measures to secure a stable economy.[1]

The close association between wages and monetary questions is unquestioned. This was so both before the First World War and in the inter-war years as well as to-day, although the closeness of the association varied in different periods. Before 1914, Britain's competitive power in world markets was strong enough to ensure monetary stability. Since the First World War, for a multiplicity of reasons, Britain's balance of payments, and therefore her monetary problems, have been difficult, and this has increased the effect of any factor, including wages, which may influence the balance of payments adversely.[2] But many other things in addition to wages are closely linked with monetary questions, and wages alone, which form only a part of the national income and of costs of production, do not provide a satisfactory standard for measuring the values of goods, services and capital investments.

Those who claim that we are on a labour standard outline some of its features and emphasise its dangers and defects, but rarely indicate how it is supposed to work. The claim itself seems to be made on the basis of short-period conditions and social factors without allowing sufficiently for the long-term force of economic factors. It is usually argued that the strength of institutional and social or non-economic factors in wage determination, and the power of the trade-union movement in wage negotiations, have greatly reduced the effects of economic factors. It can be agreed that the levels of wage-rates result from an interaction of social and economic factors and are not based solely on demand and supply, or more generally on economic forces. In the short period, which may indeed extend over a decade or more, the part played by non-economic factors, particularly social factors, is often considerable, but in the long run the tendency is for the economic factors of demand and supply and for technological changes to become dominant in determining wage standards. The long-period strength of economic forces is often underestimated, and undue weight is given to social factors.

In many countries a high stable level of employment has been maintained during the short period from 1940 to 1956, of which ten were years of war or of early post-war reconstruction. It seems to be assumed that full employ-

[1] Such measures include raising the Bank Rate and other credit restrictions, commodity taxes, import control, budgeting for a surplus and reduced Government spending. Some measures, for example, commodity taxes, would have little effect in closing the inflationary gap if, in conditions of full employment, the trade unions insisted on securing higher wages to offset the increased prices resulting from the taxation. For an interesting discussion of these and other measures (including possible direct Governmental control over wages) by the Swedish economists, Eric Lundberg, Rudolf Meidner, Gösta Rehn and Krister Wickman, see *Wages Policy under Full Employment*, edited by Ralph Turvey.

[2] The adjustment of currency rates of exchange to bring a country's foreign trade into line with economic trends abroad is not new. Many countries did this during the past hundred years. It was, however, new for Britain in the conditions which prevailed after the First World War.

ment will continue, though few economists would predict its permanence. What assurance is there that with a labour standard unemployment will not occur? If full employment is an essential feature of a labour standard it has still to be shown that adequate measures could be taken in all circumstances to maintain that standard. The experience of the past ten years, with its many special conditions, is much too short to sustain this thesis. Even in the short period if wage-rates are maintained substantially above "equilibrium" rates appropriate for a high level of employment, earnings will fall because less overtime will be worked and there will be more short-time and some unemployment, and governments may be unsuccessful in restoring a high level of employment. In the long run, such factors as mobility of labour, mechanisation, automation and other labour-saving methods will bring about a correction. When preference is expressed for monetary instability without unemployment on a labour standard to monetary stability with periodic unemployment, the assumption is made that what is preferred can be achieved. Experience over the past five or ten years is insufficient to prove that monetary instability on a labour standard would prevent unemployment.

The statement often made nowadays that agreed wage-rates can go up but cannot go down is also based on the much too limited experience of the past five or ten years when conditions were highly favourable, but such experience could be reversed in periods when conditions were unfavourable. Even to-day in the British cotton-textile industry wages have lagged because, relatively to many other industries, the industry is depressed and declining. This lag would have been still greater if cotton workers had stayed in the industry instead of moving to light engineering and other trades.

Can it be accepted that wages are now determined mainly by social forces, with economic forces playing only a secondary role? Can the parties to wage bargains set aside economic considerations and fix wages at levels which they consider to be "right" and "just"? Those who give affirmative answers underestimate the strength of economic factors. Often what is accepted as just and right is the result of rationalising on the basis of economic realities. A real wage which would be accepted as just and right in India would be rejected as intolerably unjust and wrong in England or the United States. In the main, social forces adjust themselves to economic conditions. If the desirability of having real wages as high as possible, consistently with high employment, is a social objective, it is equally an objective of economic policy. Increases in the general level of real wages result from increases in productivity, and social policy has little influence. Social forces have done little to raise the general level of real wages in Britain. By collective bargaining, and by the action of wages councils and similar statutory bodies, minimum or basic rates of wages have been standardised in many industries, but the general level has been raised over the years by industrial progress and not by non-economic pressures.[1]

[1] The fixing of minimum wages applicable throughout an industry may have forced some inefficient employers out of business and diverted their workers elsewhere, thus somewhat reducing wage inequalities without, however, doing much to raise wages.

Payment of a " living wage " might be expected to be one of the most powerful of social pressures. Yet in any country the amount of a living wage is estimated in relation to the general level of wages over a wide range of industries, and social pressures have little effect on that general level, though they may cause some changes in distribution. Also, when a living wage is fixed, full-time employment is assumed, but in periods of depression the actual earnings of many workers fall below the living wage because of short-time and unemployment.

References are not infrequent to the supposed rigidity of money rates of wages in the inter-war years and to their persistent upward but never downward movement since the War.[1] It is argued that in those years social forces held money wages up at a time when the economic forces of depression and unemployment would have tended to force them down. Experience in the inter-war years gives little support, however, to the predominance of non-economic over economic forces in determining the general level of wages. In the long period it is not the rigidity but the flexibility of wages which is remarkable, and this is due to the force of economic and technological changes. The index numbers of weekly wage-rates do, indeed, show little variation from the middle 1920s until the late 1930s, but these indexes are averages which conceal wide differences both in levels and movements. The period was one of big disparities between wages in sheltered home-market industries and unsheltered industries directly exposed to the full blast of competition in world markets. The sheltered industries, including many light industries in London and other southern districts, were prosperous by contrast with the depression in Lancashire, Tyneside and South Wales. Economic factors enabled relatively high levels of wages to be paid in the sheltered industries. Social forces were powerless to prevent severe wage reductions in the unsheltered industries. It would be impossible to convince coal-miners and textile operatives that their wages showed rock-like stability in the inter-war years. The miners, who were among the most strongly organised workers in the country, remained away from work for six months in 1926 in unavailing resistance to wage reductions, but economic forces were too strong for them; they were compelled to acquiesce in substantial wage-rate reductions, and the fall in their earnings, resulting from unemployment and short-time, was greater still. Long-period flexibility is illustrated by the fact that in the inter-war years the wages of miners were low in the scale of relative wages in different industries, whereas now they are in the top group. Flexibility is also shown by actual or effective rates rising appreciably above agreed rates in periods of prosperity, and falling to or even below agreed rates in bad times.[2]

[1] For example, Professor Hicks has spoken of the rock-like stability of wage-rates in the middle 1920s, noting that Professor Bowley's index of weekly wage-rates in Great Britain " never moved by as much as a point " between 1924 and 1928, and he has called attention to the fact that, although there were wage reductions under the impact of the depression, the wage index of 1937 was within 1% of its 1924–28 figure (Economic Journal, September 1955, p. 392).

[2] The statistics available are not adequate to measure the magnitude of these movements, and it would be useful if such data were compiled.

In the post-war years of full employment and rising prices the increase in money wages was inevitable, as it would be in any period with similar conditions. The essential difference from the inter-war years is not that wages are determined by different forces, but that then there was substantial unemployment, whereas now there are labour shortages. But there is nothing new in this. Changes in prosperity have happened before, and they will happen again, though they may be less severe than in the past. Wages may seem unduly rigid now, but in changed conditions both wage-rates and earnings would become flexible again. During full employment, many firms, especially in some of the more prosperous industries, may pay more than the agreed rates. In times of depression in some industries few firms are likely to do so, and some may pay wages below the agreed rates.[1] This danger was so serious in the Cotton Manufacturing Industry during the depression that legislation was passed in 1934 to enable statutory force to be given, in defined conditions, throughout the industry by the " common rule " to rates which were fixed in collective agreements concluded between sufficiently representative organisations of employers and work-people. In some industries many employers and workers are not parties to agreements and are free to pay wages below agreed rates, and experience shows that they do so during depressions. Thus there is considerable flexibility in rates. Earnings are still more flexible and can change substantially without any alteration in rates. Moreover, labour costs per unit of output also may vary appreciably between periods of full employment and of unemployment.[2]

Since the War the rise in money wage-rates has, in the main, followed and not preceded the rise in prices, and in some years has been less than the increase in productivity; 1955 was an exception.[3] Some of the rise in prices has resulted from the removal of war-time controls which had concealed war-time inflation, and this was one of the causes of increases in money wage-rates between 1952 and 1955. The prime mover in inflation since the War must be sought mainly elsewhere than in wage pressures, though each round of wage increases in this period of full employment has underpegged inflation, and if the pace of increased productivity were to slow down it is not unlikely that the making of regular, often annual, demands for higher wages which has grown into a habit during the past ten years would persist for a time after economic conditions had become less favourable. If so, industrial conflicts would increase and any wage gains would be inflationary until economic realities were recognised.

Wages could be persistently inflationary and full employment maintained

[1] Even in industries where various additions or supplements to agreed or basic rates are normal practice, these supplements are reduced during periods of depression. Not infrequently in wage discussions, clear distinctions are not maintained between agreed and actual money rates, actual money earnings, real wage-rates, real earnings and their relation to changes in productivity.

[2] The more efficient workers are in the main retained in periods of unemployment, and some of those who remain in employment make special efforts to work well in order to keep their jobs.

[3] Where wages follow prices and productivity, they would not replace or control the monetary standard, but would themselves be determined by the factors affecting price and productivity trends.

in a self-contained economy, but not in Britain or in other countries for which foreign markets are vital. If, because of a world depression, Britain's foreign markets seriously contracted the Government might not be able to maintain full employment. Because of overseas conditions the Government is not master in its own house, and the cost of creating sufficient demand by public spending to prevent unemployment might prove to be beyond its resources. Repeated currency devaluations would be disastrous. The fact that in the last few years Britain's export industries, with one or two exceptions, have worked full time and overtime, have had full order books and have not priced themselves out of world markets is evidence that British wages in those industries have not been too high in relation to world prices. If, because of greater foreign competition or any other cause the prices of British exports became too high, then unemployment would result, and labour costs would have to come down.[1]

Several different price and wage trends would enable the economy to operate without serious dislocation. One would be for wages to rise somewhat more than productivity; this would involve mild inflation. Another would be long-term stability of prices, the general levels of money and real wages rising at about the same rate as increases in productivity, while with a third, prices would fall as productivity increased, the general level of money wages remaining stable but real wages rising as productivity increased. Of these the second has distinct advantages, though the first would be acceptable provided the average rate of inflation did not exceed about 2% annually.

Such long-term trends would be disturbed by temporary dislocations of economic progress, such as the Korean War or adverse movements in the terms of trade, which might cause a short-period rise in the cost of living through shortages of goods, and provoke demands for higher money wages. It would, however, be neither practicable nor desirable to introduce price-control and rationing in peace-time to deal with such temporary increases in prices. In such a period of temporary shortage of goods the consequent rise in prices might enable workers in a few industries to secure increases in money wages, but, because of time lag, workers in many other industries in a less favourable bargaining position would not succeed in securing higher wages. When the temporary dislocation ended prices would fall again, though not quite to the former level, because of the effects on prices of the higher wages in the few industries which had gained them. The remaining rise in prices would, however, be small, and any subsequent upward movement of the general level of wages, whether on the basis of cost of living or wage-differential claims, would be slight.[2]

[1] It is recognised that in certain circumstances a drastic general reduction of wage-rates could aggravate unemployment by curtailing purchasing power at home, but reductions of earnings because of loss of markets by export industries, which form so substantial a part of Britain's economy, would seriously lower purchasing power at home.

[2] Frequently claims based on wage differentials are more powerful when directed to wage margins between occupations within an industry than to relative wages between different industries.

Most money wage claims are based on changes in the cost of living, on comparisons with the wages of other workers and on the profits earned by employers. It is easy to exaggerate the effectiveness of social factors in tending to reduce wage differentials and establish greater wage equality. In periods of rapidly rising prices resulting from serious shortages of consumers' goods, as in war-time, differentials are reduced because to a greater or less extent siege methods are applied by one means or another in distributing the limited supplies. In such inflationary conditions there is wide recognition that a fall in real wages is more serious for the lower than the higher wage groups, and that the former have a stronger case for a cost-of-living bonus. This process narrows the differentials or margins for skilled workers.[1] In peace-time, however, apart from dislocations causing temporary shortages, there is some tendency based largely on demand and supply for wage differentials to be widened again. The important factors are economic and technological rather than social. The persistent reduction of differentials is not trade-union policy. Technological factors, particularly the ever more extensive use of semi-automatic machinery and processes, have reduced and are continuing to reduce differentials in many industries. One cause of reductions of wage inequalities is that many of the unskilled labourers of a generation ago have been succeeded, because of technological changes, by workers operating machines in mass-production industries. The unskilled workers of yesterday have become the semi-skilled workers of to-day. Some skilled jobs have been taken over by semi-automatic machinery or have been split up so that they can be done by semi-skilled workers, and although custom or historical factors may be strong enough to retard relative lowering of the wages paid for the formerly skilled jobs, in the long run the proper (economic) rate will be established. The forces operating to do this are as strong as those which prevented the Luddites from halting the march of mechanisation. These technological changes have reduced wage inequalities, but they, and scientific progress, labour-saving methods and higher standards of living, have increased the demand for technicians, managers, teachers and professional people, so that the children of many of the skilled artisans of a generation ago have been up-graded into these categories, with a maintenance, in new forms, of differentials for skill, training and responsibility.

Differentials which were originally appropriate tend to persist by inertia or custom, and, if relative wages in a skilled occupation remain unchanged after alterations in the work have lessened the skill formerly required, then such wages are above the economic level, and maximum efficiency is not secured. It follows that a "squeezing" of differentials, which is often a

[1] Differentials are not only a problem between skilled and unskilled workers, they apply also between industries, and between wage-earners and other groups in the community. For example, in conditions of inflation, it should not be overlooked that workers, both skilled and unskilled alike in the more prosperous industries, where they are in a strong bargaining position, make much greater gains, even though the margin between the wages of their skilled and unskilled workers may be narrowed, than workers in industries in a weak bargaining position. Thus differentials are widened between these two groups of industries, and the burden of the shortages of goods is borne much more by the latter than the former.

feature of cost-of-living inflation, would have some economic value. This is true where differentials are too wide. But differentials may be too narrow, and there would be economic advantage in widening them. In such circumstances an inflationary squeeze which narrowed them still more would be economically harmful, and could result in serious shortages of skilled labour. Also, it can be too readily assumed that reductions in differentials and the establishment of greater equality are always socially desirable. There would be social as well as economic disadvantages if express locomotives, railway signal boxes, aircraft and aircraft-maintenance workshops were manned by work-people who were not paid enough to ensure the recruiting and training of men with the necessary ability and responsibility to guarantee high standards of safety for the travelling public. More generally, quality of workmanship may be more important, both socially and economically, than greater equality of wages. Distributive justice does not involve sacrificing essential standards of efficiency and quality.

Full employment in private industry can be maintained only if the selling prices of its products are sufficient to yield attractive rates of profits to the undertakings. The existence of such profits gives the trade unions the opportunity to press for higher wages, yet it is sometimes argued that the unions have learned by experience not to relate claims for higher wages directly to profits because the employers would be able to reverse the claim in conditions of declining prosperity.[1] It would be closer to reality to say that profits are always in the minds of trade-union negotiators as a major factor when making their claims. The timing and the amount of claims for higher wages are often determined by profits, and when profits are known to be low, claims are restrained or postponed. Other grounds for demanding higher wages are, of course, often included along with profits.

The main difficulty which trade unions encounter in trying to secure higher wages from profits is the variation in the levels of profit from firm to firm within an industry. In Britain the trade unions, in negotiating industry-wide collective agreements in which uniform rates of wages are fixed without variation from firm to firm, must take account of firms with low profits, which might have to dismiss work-people if wage-rates were raised beyond their capacity to pay. This system of agreed standard rates of wages leaves to the more prosperous firms opportunities to earn substantial profits. Only if such firms pay wages above the agreed rates do the workers secure part of those higher profits. In the United States, where agreements are more frequently negotiated between unions and individual firms, account is taken by the unions of the profits of each firm, but this method of negotiation has little

[1] Professor Hicks has said the trade unions have learned by experience that " a direct claim for higher wages on the grounds of the profits that are being made by employers is a dangerous claim to make. It can so easily be turned the other way up " (Economic Journal, September 1955, p. 401). Endorsement of a labour standard would imply that money rates of wages would not be reduced in a period of falling profits, but this is inconsistent with the argument that it is dangerous for trade unions to claim higher wages on grounds of high profits because such claims could be reversed in periods of falling profits.

application in British industry.[1] Nevertheless, the capacity of an industry to pay, which is mainly measured by its productivity and profits, is an essential basis for determining wage levels and wage changes in British industry. At the present time the industries with the highest wages, including aircraft manufacture and electrical engineering, pay these wages because the trade unions are able to insist on benefiting from their profits and prosperity. They are the leaders in the upward movement of wages. In other industries where profits are less the unions emphasise cost of living, standards of living and relative wages or differentials in order to enable them to secure some increases and not lag too far behind the leaders. Also the higher wages and employment opportunities of the more prosperous industries attract work-people from industries which are less prosperous and where wages have lagged behind. This tends to put a brake on wage increases in the more prosperous industries and to facilitate some increase in the less prosperous ones. Thus differentials are prevented from becoming unduly wide.[2]

The opinion is sometimes expressed that, as already noted, an important cause of the rapid rise in money wages, especially since 1951, has been the effects on the cost of living of the removal of price controls, rationing and food subsidies, and that once these influences are out of the way, wages will become relatively stable. Also, there has been upward pressure in the efforts to restore wage differentials for skill after the dislocations of the War. An example of this was the " leap-frog " manœuvres of the National Union of Railwaymen and the Associated Society of Locomotive Engineers and Firemen when the drivers and firemen insisted on higher differentials. These factors will play a smaller part in the future, but they have not been the main causes of rising wages.

Maintenance of a high stable level of employment is one of the desirable objectives of Government policy.[3] There are, however, other important economic objectives, including maintenance of reasonably stable prices, balance of payments and stable exchange rates. The Government is responsible for promoting the best economic interests of the country, and in view of such interests it should not neglect these other objectives in favour of full employment. It cannot acquiesce in the trade-union movement or any other voluntary body exercising power in ways which would prevent the attainment of these objectives. A Government guarantee of full employment cannot be unconditional. Where policies are in conflict

[1] This is, no doubt, one of the reasons why work-people and unions in the United States favour companies making big profits. By bargaining mainly with individual companies the link between wages and profits is somewhat closer and more direct than in Britain. It is also a reason why work-people and unions in the United States put fewer restrictions on methods of increasing productivity.

[2] The high yields of taxation from the prosperous industries are available for community purposes, and tend to reduce differentials in standards of living between people in industries with different profit levels.

[3] A high stable level of employment does not imply full employment or over-employment, but a level which ensures redeployment of labour so that work-people are attracted by better wages and employment opportunities away from industries which are declining to those which are expanding and where their value to the economy is greater.

the Government must aim to secure the most satisfactory compromise. If money wages are determined mainly by pressure of separate unions and are fixed at levels likely to cause serious inflation and successive devaluations of the currency it would be sound policy for the Government to curb the excessive demand for labour which made such wage levels possible. This would be in the interest of the workers themselves, by avoiding dislocations of the economy which would cause unemployment and endanger improvements in their standards of living. An unsound wage policy could make the maintenance of full employment impracticable. The Government could not be expected to provide resources of sufficient magnitude to prevent unemployment if this resulted in a wage policy which it did not control and which was contrary to the economic interests of the country.

J. Henry Richardson

University of California,
Berkeley.

INPUT–OUTPUT ANALYSIS: AN APPLICATION

THE purpose of this paper is, simply, to demonstrate some of the properties of an input–output table and to report the results of an exercise using data for certain inter-war years. It is interesting to find that in the United States, where much time and effort have been devoted to this type of analysis, very few applications of the method have been carried out. Those empirical studies that have been made, based largely on the work of Leontief at Harvard and of Evans and Hoffenberg at the Bureau of Labor Statistics, appear to suggest that projections of output, industry by industry, can be made with more accuracy by input–output techniques than by some particularly naïve methods, but with results inferior to those obtained from regressions of the total output of each industry on time and gross national product.[1] In the United Kingdom, where input–output analysis is still very much in its infancy, evaluation and criticism of the method have been confined, so far as we know, to the theoretical level. We hope that this exercise may help to promote an understanding of some empirical aspects.

I. THE INPUT–OUTPUT SYSTEM

Before presenting the calculations themselves, it may be useful to have a brief description of the rationale of input–output analysis. The method can be regarded as either of two things, each deserving criticism on its distinctive merits. In plan view, so to speak, the construction of an input–output table is an extension of social accounting designed to emphasise, not the division of the economy between production, consumption and asset formation, but the commodity transactions between industries. Each transaction appears in the table as an output or sale and simultaneously as an input or purchase, and when factor incomes are included as inputs, then the sum of the outputs from each industry is observed to balance, in an accounting sense, with the sum of inputs. For ease of presentation the outputs are set out in rows, the inputs in columns, so that each industry has attributed to it a row and a column making a balanced account. The table which can be drawn up by classifying production in some suitable way into an array of these rows and columns can be valuable in itself as a chart of the productive structure during a chosen period. Furthermore, to give ourselves a summary, we may deduce for each industry the proportion which each input bears to the total output. These proportions, which may be reduced to percentages, are designated technical or input coefficients, and can be presented in a square table, or matrix, corresponding to the table of transactions.

To " elevate " the plan view of the economy's structure into a model, the

[1] C. F. Christ, " A Review of Input–Output Analysis," *Input–Output Analysis: An Appraisal* (Princeton: National Bureau of Economic Research, 1955).

following working assumptions have usually been made : (*a*) that there are constant returns to scale, and (*b*) that the combination of inputs, observed accounting-wise in the input–output table, will remain in constant proportions whatever the level of output, that is, there can be no substitution between different materials or fuels, and no technological progress within the context of any single table. The bold simplicity of such a theory of production would make it seem likely that any predictions of output levels based upon it would be progressively less accurate the further the projections from the base year for which the coefficients were observed.

There are two types of model, however. In the earlier " closed " version the proportional relationships just mentioned were assumed to extend beyond the purely industrial sectors of the economy, so that what we normally term final consumption, by households, by government or by foreign countries, became *inputs* to those sectors, giving rise to labour services, " administration " and imports in a proportionally related manner. These " outputs " then became in their turn " inputs " to industrial sectors, giving the system a completely circular and interdependent structure of input–output relationships.

Since each output, in this version, is made up of a unique combination of inputs, then the only dimension that is free to alter is the scale or level of activity at which the system is to be in equilibrium. Some writers have pointed the analogy between this feature of the Leontief model and the possibility of equilibrium at levels below full employment which is so distinctive a part of the Keynesian theory. If we represent this Leontief model in symbolic but familiar terms, then the matrix of coefficients, usually denoted by A, and the column vector of n total outputs, y, are related by the equation

$$y = Ay$$

every " industry's " output, in this system, being the sum of its inputs into all the other " industries." It follows that

$$y - Ay = 0$$

or

$$(1 - A)y = 0$$

which is soluble when A and any single element in the vector, y, are known.

The version which is used in this exercise is much less rigid and naïve in form, and consequently offers more hope of becoming useful in practice. Instead of regarding the activities of households, government, capital formation and foreign trade as " processes " for which there are proportionally related inputs and outputs, these expenditures are regarded as taking place outside the system, while labour and other factor incomes are looked upon as " primary " or original inputs in common with goods and services imported from outside the system. The model is thus " open-ended." If the final demands—*i.e.*, private and public current consumption, exports and additions to capital—are calculated or estimated in advance, then the theory of production permits the estimation of output levels necessary to satisfy all

the demands, final and intermediate. In algebraic language if the set of final demands, x, and the matrix A are given, then

$$Ay + x = y$$

Therefore, the vector of outputs

$$\begin{aligned} y &= (1 - A)^{-1}x \\ &= (1 + A + A^2 + A^3 \ldots)x \end{aligned}$$

and so, by means of this inversion or expansion, we can obtain industry by industry the outputs which will satisfy the assumed or estimated demands from outside the system and, simultaneously, the indirect or intermediate requirements arising within the interdependent set of industries. The potentialities and limitations of the method can be demonstrated if the estimates of output obtained by this sort of calculation can be checked, industry by industry, with what are generally regarded as firm estimates obtained, for example, from a Census of Production. It is, in fact, just such a comparison that we shall proceed to make. But first there is one further technical point that requires some explanation.

The proportionality assumptions which we are using are thought of, usually, as referring to proportions by quantity and we shall follow this practice here. The coefficients in A might be calculated as explicit quantity ratios, bushels of wheat per hundredweight of flour and so forth, but as usual in economic measurement it is more practical to apply the yardstick of money and express the quantities in terms of value at a stated set of prices. If the inter-industry transactions are recorded at their current values, then the coefficients will relate to quantities valued at the prices of the year to which the table relates, the base year. If comparison is to be made with other years, the quantities of final demands and total outputs in those other years will have to be given in the same units, namely values at the base-year prices.

In practice, this requirement is not a burden, since economic time series in this form are becoming available in continually increasing scope and detail. We shall have to face many of the usual index-number problems, but they have been so extensively discussed that they need no rehearsal here. There is, however, one problem which occurs with extra force in this context of input–output analysis. With indexes one frequently has to accept some practical definitions of value and quantity, such as those given by market transactions, although one has an ulterior interest in, say, food values or utilities. Here, too, we must accept market valuations, although we are particularly interested in technical properties. Where, because of market imperfections, the technical properties are not fully reflected, our measures may show changing proportions when the strict technical proportions are unchanged. For instance, if the market grading of coal does not fully reflect its capacities for generating gas, a constant input of coal to the industry in gas-generating terms might appear as a fluctuating series at market values; sometimes the gas industry could obtain good gas coal in a low grade, but at other times it would have to buy a higher grade. If the difference is not

reflected in prices we cannot allow for it, but one should be on the look-out for its effects.

Recapitulating, we wish to emphasise that the whole input–output approach has two distinct aspects. Its more pedestrian property is to demonstrate by means of a consistent accounting framework, the input–output table, the interdependence between sectors of the economy for the period to which the data relate. The other, more complex property is that by way of a drastically simplified theory of production the method offers a means of predicting output levels. The predictions are, however, conditional upon independent knowledge of the so-called *final* demands. In our equations, y, the output by industries, is shown as a function of x, the final demands. In more familiar, Keynesian, terms, this is showing O as a function of $C + I$, but with this difference that O is expanded, as it were, to show the inter-industry transactions, which are hidden from view in the consolidation of aggregative national-income analysis. It is in fact from these *intermediate* sales and purchases between industrial sectors that the input–output coefficients are derived.

II. The System Applied

We require, in order to experiment with the technique, reasonably accurate and sufficiently detailed figures of final expenditures, preferably for a series of years but at constant prices. If we must formulate estimates of *future* expenditures, and these turn out to contain errors, then the estimates of outputs based on them may contain errors not only due to the technique in which we are interested, but also due to the assumptions made about final demands, which we wish to exclude from consideration. To get nearer to isolating cause and effect we can try out the technique using *past* expenditures, and then compare the resulting estimates of outputs with independent production indices. In so far as the final demands or expenditures are correct and consistent with the output indices, then discrepancies between these outputs and the outputs calculated from the final demands by the input–output technique should in principle be attributable to shortcomings of the technique, and therefore constitute a test of its powers.

There is available for the United Kingdom only one input–output table as yet that lends itself to this sort of exercise. It is the work of Dr. Barna, and it relates to 1935.[1] Although suitably classified final expenditures and industrial outputs are available for several post-war years, beginning with 1948, the technological changes of 1935–45 make it imperative that we confine a trial of an inter-war "model" to inter-war years. We are in fact limited to five years, 1924, 1930, 1933, 1934 and 1935, for which Census of Production indices are ready to hand for evaluating our calculations. Most of the information we require on final expenditures at constant prices is available in the national-income estimates appearing under the editorship

[1] T. Barna, "The Interdependence of the British Economy," *Journal of the Royal Statistical Society*, Vol. CXV (Series A), Pt. I, 1952.

of Richard Stone.[1] In addition, expenditures on goods and services by central and local government have been calculated separately, using the Appropriation Accounts as a guide, and exports for the five years in question have been re-classified for our purpose and re-valued at 1935 prices.[2] In terms of our earlier equations, we now have estimates of x. To calculate y, the series of outputs by industries, we require the inverse of A, the set of input or technical coefficients, and this we obtain from the 1935 input–output table.[3] To evaluate the answers which the method yields for y, we have the comparable output totals by industries given in the Fifth Census of Production.[4]

There are, however, one or two particular problems involved in re-classifying the various data and in setting up the calculation, which we ought to mention briefly. First of all, the method whereby the output indices were set up so as to be comparable, industry by industry, with the headings or sectors of the input–output table, thirty-six in number, deserves a few words of explanation. It consisted of applying volume indices taken from the Fifth Census of Production to the base year (1935) total output of each sector in the input–output table. This could be done quite simply when there was only one index number series per sector as, for example, in the case of Coal-mining. Where the output of the sector had been obtained by aggregating the products of more than one trade as shown in the Censuses, for example, Mechanical or Electrical Engineering, then the individual trades' outputs in 1935 were taken as weights in calculating an aggregate index. This ensured that for 1935, the base year of our exercise, there would be no discrepancies between the independent outputs in the Census and those that could be calculated by multiplying the set of coefficients by the final demands for that year. In principle, the two sets of estimates must be identical for the base year.

Several important adjustments had to be made to the estimates of final demand in order to bring them as nearly as practicable into line with the definitions and valuations used in the 1935 input–output table. As with the total outputs, the final " bill of goods " had to be cast under the thirty-six headings of the input–output table. This meant, for example, that estimates of consumers' expenditure on all foodstuffs had to be divided between the first of Dr. Barna's headings—Agriculture, Forestry and Fishing—and the twenty-sixth—Food Processing. To complete the re-classification, two further steps were necessary, because (*a*) direct consumption of imports, and (*b*) transport and distributive margins had both to be separated from the original estimates of consumption. The reasons for these adjustments were that changes in the direct consumption of imported goods manifestly do not require changes in domestic production and are " routed "

[1] Richard Stone, *The Measurement of Consumers' Expenditure and Behaviour in the United Kingdom*, 1920–1938, Vol. 1 (Cambridge: National Institute of Economic and Social Research and Department of Applied Economics, 1954).

[2] For invaluable and extensive help in these calculations, we wish to thank Dr. K. Maywald and Messrs. F. E. A. Briggs, G. D. Garton and D. A. Rowe.

[3] The complex task of inverting the 1935 matrix has been performed by Messrs. Ferranti Ltd., to whom the Department of Applied Economics owes a debt of gratitude.

[4] Board of Trade, *The Fifth Census of Production, 1935, Final Report* (H.M.S.O., 1939).

separately in Dr. Barna's table, and secondly that this input–output table records transactions at producers' prices so that final buyers are shown as purchasing a " bill of goods " not at retail prices but at ex-factory prices (approximately), and, separately the residual sum of all distributive services which account for the difference between ex-factory and " delivered " valuations. Dr. Barna himself very kindly helped us over this computational hurdle by sending us a reconciliation between his 1935 " bill of goods " valued at producers' and at purchasers' prices. This enabled us to link the consumption data—consumers' expenditure, government expenditure, exports and capital formation—for 1934, 1933, 1930 and 1924, as well as for 1935, sufficiently closely with the figures he himself obtained for the input–output table relating to 1935.

It must be emphasised, however, that there are inevitably imperfections in some of the data relating to this period, and in view of this we decided that they did not justify more than a summary treatment. The various series have in fact been taken pretty much as they stood. Some are ill-suited to our purpose, for besides presenting in some instances discrepant estimates of the same variable, there are often artificial agreements where consumption series have been partially or wholly derived from data contained in censuses of production. These peculiarities and snags are, however, typical of those which any exercise such as this must expect to meet in practice.

We have mentioned four components of the " bill of goods," but there is in Dr. Barna's table a fifth column, literally and metaphorically. This column has two elements: first, it contains all stock changes (the capital formation column covering only fixed capital) and, secondly, it contains the residual part of each industry's total output which could not be allocated to any user. These items inevitably appear in input–output work in some form, and they are a headache when the system is to be applied to other years; a headache made the worse here because the two items are lumped together.

With practically no information available on stock changes in each of our five years, some sweeping assumption had to be made. The choice seemed to be between assuming the stock change to be the same or the same proportion of total output in each industry in all years as in the base year, or assuming stock changes to be zero in all years outside the base year. Since the unallocated item could not be separated from stocks, the same assumption had to be made for both items, and, although it would be reasonable to move the unallocated item alone by total output, the problem of stocks made us plump for the assumption that the two together be set at zero. The results which are presented in the tables that follow must be interpreted very carefully in the light of this drastic assumption.

Briefly, then, with final demands built up in this way the total outputs of all thirty-six industries could be estimated. However, it is only worthwhile estimating the output for those industries where the Censuses provide a comparison. These number 33 or 34 in the years of the full Censuses and 20 or 21 in the years covered by Import Duty Act Enquiries; the relevant number for each set of figures is given in the tables.

TABLE I

Comparison of Total Outputs

£(1935)m.

	Industry.	1924.				1930.				1933.				1934.				1935.			
		A.	B.	Bd.	Bi.	A.	B.	Bd.	Bi.	A.	B.	Bd.	Bi.	A.	B.	Bd.	Bi.	A and B.	Bd.	Bi.	
1	Agriculture, Forestry and Fishing	241	261	208	53	—	—	—	—	—	—	—	—	—	—	—	—	294	231	63	1
2	Coal-mining	176	147	80	68	161	149	76	73	—	—	—	—	—	—	—	—	146	65	81	2
3	Other Mining	18	17	2	15	21	19	2	17	—	—	—	—	—	—	—	—	22	3	19	3
4	Building Materials	37	44	8	36	49	55	10	45	49	45	7	37	58	50	8	42	62	15	47	4
5	China and Glass	25	30	15	15	26	29	14	15	27	26	12	14	30	29	13	16	32	14	18	5
6	Coke Ovens	17	13	4	10	17	14	3	10	14	12	3	9	17	13	3	10	17	5	12	6
7	Chemicals	62	74	37	37	65	80	41	39	76	79	42	37	85	83	44	39	93	48	45	7
8	Soap and Polishes	31	31	28	3	31	33	30	3	35	34	31	3	37	35	32	3	39	35	4	8
9	Oils and Paints	64	58	14	44	70	68	18	50	67	64	17	47	70	64	20	44	82	26	56	9
10	Iron and Steel Manufacture	173	163	40	123	156	167	35	133	144	137	24	113	176	156	27	129	193	40	153	10
11	Non-ferrous Metals	40	40	11	30	44	43	10	33	40	41	11	30	50	45	12	34	57	16	41	11
12	Shipbuilding	71	60	55	5	68	77	71	6	—	—	—	—	—	—	—	—	47	39	8	12
13	Mechanical Engineering	166	166	113	53	171	183	121	62	133	119	76	43	161	153	103	50	187	128	59	13
14	Electrical Engineering	60	65	37	27	74	81	47	34	77	75	47	28	94	87	55	32	110	51	59	14
15	Motor and Cycle	72	83	53	30	105	109	72	36	—	—	—	—	142	139	96	43	172	121	51	15
16	Aircraft	4	4	4	0	10	11	10	1	7	9	9	1	9	10	9	1	14	13	1	16
17	Railway Rolling Stock	54	47	22	25	48	46	20	27	—	—	—	—	—	—	—	—	45	17	28	17
18	Metal Goods n.e.s.	122	117	65	53	131	122	63	59	146	132	78	54	164	144	82	62	173	105	68	18
19	Cotton and Silk	224	258	120	138	167	206	84	122	202	198	79	119	206	202	80	122	211	83	128	19
20	Woollen and Worsted	131	141	60	81	100	118	42	76	134	123	46	77	134	130	50	80	142	55	87	20
21	Hosiery and Lace	36	41	36	5	35	41	36	5	44	46	41	5	46	47	42	5	48	43	5	21
22	Other Textiles	57	56	25	31	52	56	25	32	54	51	21	30	60	55	23	32	61	26	35	22
23	Textile Finishing	36	36	—	36	27	30	—	30	30	29	—	29	31	30	—	30	32	—	32	23
24	Leather and Fur	41	42	16	26	39	41	15	27	41	42	15	26	43	42	15	27	47	18	29	24
25	Clothing	192	205	192	13	205	216	202	14	—	—	—	—	—	—	—	—	222	208	14	25
26	Food Processing	281	337	250	87	327	372	277	95	—	—	—	—	—	—	—	—	406	304	102	26
27	Drink and Tobacco	337	326	276	50	353	340	290	50	—	—	—	—	—	—	—	—	361	299	62	27
28	Wood Manufactures	68	62	28	34	85	80	42	39	—	—	—	—	—	—	—	—	99	57	42	28
29	Paper	43	56	13	43	55	62	15	47	—	—	—	—	—	—	—	—	75	21	54	29
30	Printing and Publishing	125	112	47	65	141	122	54	68	—	—	—	—	—	—	—	—	146	70	76	30
31	Rubber	11	15	7	8	21	21	13	9	24	23	14	9	27	24	14	10	28	16	12	31
32	Miscellaneous Manufactures	17	17	15	2	19	18	15	3	22	18	16	2	23	20	17	2	24	20	4	32
33	Building	330	366	239	127	417	429	289	139	—	—	—	—	—	—	—	—	471	322	149	33
34	Gas, Water and Electricity	130	175	100	75	179	204	125	79	—	—	—	—	—	—	—	—	243	153	90	34
	TOTAL	3,491	3,666	2,219	1,446	3,467	3,641	2,166	1,476	1,366	1,303	588	715	1,662	1,558	745	813	4,401	2,667	1,734	

A = Total Output from Census. B = Total Output from Final Demands, of which Bd is Final Demand component and Bi is Indirect Demand component.

TABLE II

Discrepancies between Census and Input–Output Estimates of Total Outputs by Industries

(Discrepancy as percentage of Census estimate.)

	Industry.	1924.	1930.	1933.	1934.
1	Agriculture, Forestry and Fishing	+ 8·4	—	—	—
2	Coal-mining	−16·3	− 7·6	—	—
3	Other Mining	− 4·0	− 4·8	—	—
4	Building Materials	+18·2	+11·5	− 8·2	−13·7
5	China and Glass	+19·6	+13·8	− 3·9	− 5·8
6	Coke Ovens	−19·8	−17·8	−13·1	−23·3
7	Chemicals	+20·2	+22·9	+ 3·7	− 2·1
8	Soap and Polishes	− 0·2	+ 5·7	− 3·1	− 4·2
9	Oils and Paints	− 9·7	− 3·9	− 5·0	− 9·2
10	Iron and Steel Manufacture	− 6·1	+ 7·1	− 4·5	−11·7
11	Non-ferrous Metals	+ 1·2	− 2·6	+ 1·0	− 9·5
12	Shipbuilding	−15·3	+13·3	—	—
13	Mechanical Engineering	+ 0·1	+ 7·2	−10·0	− 5·0
14	Electrical Engineering	+ 7·2	+10·5	− 2·5	− 7·6
15	Motor and Cycle	+14·9	+ 4·0	—	− 2·4
16	Aircraft	+10·0	+15·1	+27·6	+17·1
17	Railway Rolling Stock	−12·6	− 3·9	—	—
18	Metal Goods, n.e.s.	− 4·0	− 6·6	− 9·6	−12·4
19	Cotton and Silk	+15·4	+23·3	− 1·9	− 1·7
20	Woollen and Worsted	+ 7·8	+18·6	− 7·9	− 2·8
21	Hosiery and Lace	+11·7	+17·9	+ 3·6	+ 2·3
22	Other Textiles	− 2·1	+ 8·5	− 4·8	− 7·3
23	Textile Finishing	+ 1·3	+ 9·0	− 2·6	− 2·7
24	Leather and Fur	+ 2·6	+ 5·0	+ 0·9	− 1·0
25	Clothing	+ 6·5	+ 5·4	—	—
26	Food Processing	+21·7	+12·0	—	—
27	Drink and Tobacco	− 3·4	− 3·9	—	—
28	Wood Manufactures	− 8·0	− 5·9	—	—
29	Paper	+32·4	+12·8	—	—
30	Printing and Publishing	−10·7	−13·3	—	—
31	Rubber	+35·2	+ 2·9	− 5·6	− 9·6
32	Miscellaneous Manufactures	+ 0·2	− 3·6	−17·3	−14·3
33	Building	+10·9	+ 2·7	—	—
34	Gas, Water and Electricity	+34·6	+14·0	—	—

III. RESULTS

(i) *Output*

The main result of the exercise is presented in Table I. For each of the thirty-four industrial sectors we have obtained, as already indicated, estimates of final demands denoted by Bd in Table I. The outputs calculated by multiplying these expenditures by the set of production coefficients appear for each of the years in the columns headed B. The outputs derived from independent production indices, with which we are comparing the calculated outputs, are given in the columns headed A. It will be noted that for 1935, the base year, columns A and B are identical. The columns labelled Bi are the intermediate or inter-industry demands, being the differences between total outputs, B, and outputs required to satisfy final demands, Bd.

The principal object of the exercise is to observe how closely the calculated outputs and the Census outputs agree in the years, 1924, 1930, 1933 and 1934. A straightforward comparison of the two sets of outputs, *A* and *B*, seems to

A = Total Output from Census. B = Total Output from Final Demands, of which Bd is Final Demand component and Bi is Indirect Demand component.

us to afford some assessment of the input–output method's potentialities, either as a predictive device or as a tool for dissecting the past, for seeing more clearly how, for example, technological changes or substitutions between materials have been operating.

Table II is derived from the previous table by expressing each difference between the Census and input–output estimates as a percentage of the former, *i.e.*, $\frac{B-A}{A} \times 100$. It will be observed that for most industries these percentage discrepancies fluctuate over the four years but tend on the whole to diminish towards the base year. This is to be expected, and is demonstrated more succinctly in Table III by means of frequency distributions. Lest it be objected that, in comparing thirty-four sectors in 1924 and thirty-three in 1930 with only two-thirds that number in the later two years, we have introduced an obvious bias, we have set in parentheses alongside the full-scale distribution the percentages that obtain when the minimum of twenty sectors are compared throughout.

TABLE III

Frequency Distribution of Discrepancies

(Cumulative frequency per cent.)

	1924.	1930.	1933.	1934.
No. of industries	34 (20)	33 (20)	20 (20)	21 (20)
Sum of discrepancies (£m.)	175 (58)	174 (115)	−63 (−63)	−104 (−101)
0–5%	29 (40)	30 (25)	55 (55)	43 (40)
0–10%	50 (60)	58 (55)	80 (80)	72 (75)
0–15%	68 (70)	82 (65)	90 (90)	91 (90)
0–20%	88 (90)	94 (90)	95 (95)	95 (95)
0–25%	91 (95)	100 (100)	95 (95)	100 (100)
0–30%	91 (95)	—	100 (100)	—
0–40%	100 (100)	—	—	—

It can readily be seen that, broadly speaking, the fit improves towards 1935, but that the 1934 figures do not represent a clear improvement on those for 1933. It is perhaps worth noting, in passing, that the sums of the discrepancies between Column A and B in Table I are positive for 1924 and 1930, while in 1933 and 1934 the sum is negative. In other words, the projections give " too high " an estimate of output on the average for 1924 and 1930, but " too low " a figure for 1933 and 1934. The most likely among a host of possible explanations of this movement in the discrepancies would be that for all years in question the main source of errors could be traced to the inherently weak assumption that stock changes were zero in 1924, 1930, 1933 and 1934. This would imply that stocks were falling in 1930 and increasing in 1933 and 1934.[1]

Besides this possibility, there are two causes of discrepancy peculiar to the technique we have been trying out. The first of these we may call *technical*

[1] This implication is borne out by calculations made by Barna. See T. Barna, " Value of Stocks and the National Income," *Economica* (new Series), Vol. IX, No. 36, November 1942.

developments or *secular changes* in an industry, changes in fact in the coefficients, which help to explain the differences between the estimates of output for such sectors as Coal-mining, Chemicals, Electrical Engineering, and Gas, Water and Electricity. It will be seen that, on the 1935 coefficients, the tendency is to underestimate the output level in an earlier year for an industry upon whose output other sectors have economised The converse applies particularly to Chemicals, Electricity Supply and Electrical Engineering. The same could also be said of Paper and Rubber, for whose outputs the inter-industrial demands increased throughout this eleven-year span.

The second, and on the whole more potent, cause is the *substitution* of domestic supplies for imported industrial materials and certain foodstuffs during and immediately after the Great Depression. It is perhaps surprising that so drastic a change of British trade policy as took place between 1931 and 1934 does not create bigger discrepancies than can, for example, be observed in the Food Processing and Textile sectors, since most forecasting models lean heavily on the assumption that no drastic reversals of policy will take place during their currency. It should be noted, on the other hand, that Table VI, on the volume of imports, shows up quite clearly the limitations imposed by the assumption that the proportional composition of inputs into any sector shall remain fixed. Substitution may also have taken the form of changes in the product composition as a sector.

It may be thought that the results could be evaluated better if compared with other projections, even if these were quite naïve. Two comparisons are given in Table IV. The first alternative projection is made by assuming that

TABLE IV

Comparison of Projections of Output

(Discrepancies from Census estimates; cumulative frequency percentage of thirty-three industries analysed.)

Projection by: / Discrepancy (%).	1924.			1930.		
	Input–output.	Total industrial output.	Final demands.	Input–output.	Total industrial output.	Final demands.
0–5	30	18	9	30	15	25
0–10	48	30	34	58	51	47
0–15	67	50	59	82	70	67
0–20	87	65	69	94	80	81
0–25	91	65	78	100	88	94
0–30	91	70	84	—	93	100
0–50	100	91	97	—	100	—
0–100	—	100	100	—	—	—

all the industries have the same movement, and this movement is given by the series for the total output of the thirty-three industries as found from the Census. The second alternative assumes that each industry's total output moves proportionally to the final demand on that industry, allowing no interaction between industries. (Textile Finishing, which has no final

output, is moved on the total final demand from all textile industries.) These are, of course, very similar to the comparisons that have been made for the American economy, to which we have referred earlier.

The comparison is self-explanatory, indicating mainly that projecting outputs by input–output techniques does offer some improvement over cruder methods.

(ii) *Employment and Imports*

Let us now turn aside for a moment to consider two auxiliary exercises. It has been suggested that input–output techniques can be used to project employment industry by industry, and also that some idea of the import content of output can usefully be deduced in a similar way. Taking 1924 and 1930 as suitable years for these experiments, we projected employment figures from 1935 totals, first by applying the labour coefficients obtained from the input–output table, and secondly, by assuming that numbers employed in each of the thirty-four industries moved exactly as did total output in these industries, the figures for total output for the three years being those recorded in the Census of Production for 1935. Both results are compared industry by industry with estimates of the actual numbers employed, as given in the Census of Production, and the discrepancies are shown in Table V, once again using frequency distributions.

TABLE V

Comparison of Projections of Employment

(Numbers of Sectors.)

Projection by: / Discrepancy (%).	1924.		1930.	
	Input–output.	Production Index.	Input–output.	Production Index.
0–5	7	4	8	5
0–10	11	7	21	10
0–15	17	13	24	19
0–20	21	21	26	26
0–25	23	26	28	29
0–30	26	30	32	32
0–50	32	32	33	33
0–100	33	33	—	—

It seems from this comparison that neither method has any distinct advantage, and the exercise must be considered inconclusive. However it will be worth repeating this exercise when better, post-war, data become available.

There is no unique way in which an input–output table should be drawn up, and the treatment of imports provides several possibilities. Where imports are substitutes for home production the relative quantities of imports and home supplies used will depend mostly on trade policy and relative-price conditions and not on techniques. Here the proportionality assumption is very likely to break down. An alternative treatment to Dr. Barna's

is to treat the competitive imports as negative exports of the industry providing the goods at home, the industry then showing as output going to other users both its own production and the imports. The amount imported is then determined *a priori*, along with the final bill of goods, and not by the input–output relationships. In our application such a system would greatly have reduced the discrepancies because the sharp discontinuities introduced by the import duties of the early thirties would have been taken outside the scheme of proportional relations.

Coefficients of the total import content for each class of commodity can be found by multiplying the row of direct import coefficients (direct input of imports into each industry per unit of industry output) into the inverse matrix, $(1 - A)^{-1}$. The import contents of total output were calculated for 1930 and 1924 by applying these import-content coefficients for 1935 to the final demands for those years, covering all thirty-six sectors in the 1935 input–output table. The import content thus estimated remained very stable for all the three years, 1924, 1930 and 1935, at $8\frac{1}{2}\%$; this shows that relative changes between the industry classes in final demand had no influence on the total volume of imports going to industry. The estimated movement in the volume of imports and the movement shown by the official indexes are compared in Table VI. This suggests that for information on imports the input–output method will be of little or no use when there are large changes in price structure, as between 1930 and 1935, but can be helpful when relative prices are steadier, as between 1924 and 1930.

TABLE VI

Volume of Imports

(1935 = 100.)

	Estimate.	Board of Trade Index.
1924	83	97
1930	87	103
1935	100	100

Note: Board of Trade Index adjusted to exclude imports going direct to final demand.

IV. CONCLUSION

First of all, we must emphasise that owing to the imperfections of inter-war data we have not been able to weigh input–output analysis precisely in the scales of acceptability as a means of predicting such variables as output, employment and imports. But we have tried to demonstrate what are the approximate limitations of the method when applied to these problems over a period roughly coinciding with the inter-war trade cycle. That the estimates of output which the method yields for 1924 and 1930 are on the average 5% different from the estimate of industrial output afforded in the Census of Production does not seem sufficient grounds for dismissing the technique as being devoid of practical usefulness.

Against this it can be argued that until a proper test, based on estimates of *future* demand, is carried out, any answers provided by exercises such as ours give at best only grounds for hope. In comparing the projections of outputs which the input–output technique has yielded with the firmer estimates derived from the Census, we have attempted to show how strong, or weak, the grounds for hope may be. We have pointed out one or two important reasons for the discrepancies which emerge. There remains, however, a difficulty in this kind of work which we ought to emphasise in conclusion.

If one is interested in predicting future levels of output, then it is important to remember that the successful use of an open-ended input–output model puts a special premium on being able to prepare consistent and accurate estimates of final demands. In obtaining preliminary series we discovered that for one or two sectors the data on final demand were significantly in excess of the total outputs given in the Census relating to the same year. When this sort of inconsistency comes to the surface it can be removed in an exercise of this kind, but it is not at all certain how far and to what extent it may pervade the other sectors where supply seems, in the base year, to accord well with demand. In short, one must ensure consistency, and an acceptable standard of accuracy in the prediction of final expenditures, before one can apply the method.

To suggest a criterion by which to measure the usefulness of the approach is beyond the scope of this article. It may well be that other uses besides prediction will suggest themselves, and we would contend that in general standards of accuracy are for the user to decide. We have attempted to show what results can be expected when the technique is tried out using past data. It may well be that some will find the errors small enough to render the approach sufficiently accurate for their purposes, while others may agree with the view of Professor Carter and Mr. Roy that " In principle, the forecasting of real product could be done in a more scientific and detailed way if there were available for the United Kingdom more input–output studies; but this form of research is still in its infancy here, and many of its problems, both theoretical and practical, have still to be solved."

A. A. Adams
I. G. Stewart

Department of Applied Economics,
University of Cambridge.

INNOVATIONS AND EQUILIBRIUM GROWTH

THE central proposition of the theory of economic growth originated by Mr. Harrod arises from the recognition that investment is capacity-increasing as well as income-generating. Thus if the new capacity is to be utilised, the equivalent new demand must be generated. Equilibrium growth is then defined as the constant achieving of the optimum relation between the stock of capital and the rate of output. Given a constant ratio between saving and income—s—and a constant capital–output ratio—k—it is evident that capacity will grow at a percentage rate s/k, and equilibrium requires that income grow at the same rate. If this rate is also the rate that prevents involuntary unemployment, then there would be equilibrium growth at full employment.

If labour and capital are growing at the same percentage rate the maintenance of equilibrium is the problem of equating a growing aggregative supply with a growing aggregative demand at a constant level of *per capita* income. If labour and capital are growing at different percentage rates the problem is more complex, as some adjustment in the productive process is likely to result from the changing relative supplies of inputs. It becomes necessary, then, to examine the consequences of such adjustments on the rate of growth of income and on the maintenance of equilibrium. Our problem here is limited to the case where capital is growing more rapidly than labour, with the obvious result that the ratio of capital to labour must rise steadily if the capital is to be utilised. This is a necessary condition for the growth of *per capita* income (assuming no reserve of unemployed labour and no innovation), and for this reason seems to be somewhat more interesting than the opposite case.[1]

We proceed within the framework of the Harrod model except for the arbitrary assumption made at the outset that capital is growing more rapidly than labour, and consequently *per capita* income is rising. We also assume a production function with only two inputs, capital and labour, and our analysis is therefore subject to all the shortcomings that such an assumption imposes.[2] To simplify further we assume that the rate of growth of population is zero, and any increase in capital represents an increase in the capital–labour ratio.[3]

[1] Harold Pilvin, "Full Capacity *vs.* Full Employment Growth," *Quarterly Journal of Economics*, November 1953, considers a model in which capital and labour are growing at different percentage rates, and adjustment by way of changed input combination occurs immediately. See the comments of R. F. Harrod and Evsey Domar appended to Pilvin's article and D. Hamberg's comments in the same journal, November 1954.

[2] Joan Robinson has recently discussed some of the difficulties and hazards involved in the use of such a production function in "The Production Function and the Theory of Capital," *Review of Economic Studies*, Vol. XXI (2), 1953–54.

[3] This assumption may be misleading, since an increasing labour supply frequently leads to economies of scale by way of further division of labour. An increasing population certainly has an effect on the composition of demand also. These problems are, however, beyond the scope of the present discussion.

I

Consider first the problem in a society in which no innovations are occurring, but capital is growing at a constant percentage rate r. To use the increasing relative supply of capital, firms must be assumed to adopt methods of production that require relatively more capital that have been known but not previously used.[1] The production function remains the same, and the effect on the capacity of the system is determined by introducing the increasing capital input with a constant labour input into an unchanging production function. But if the new input combinations were known and not used, they can be assumed to be put into effect by entrepreneurs only by virtue of changes in the relative costs of inputs. In our case here it is required that capital costs fall steadily compared to labour costs.

In less complicated days the rate of interest would be presumed to fall as capital accumulated, and this would have provided the necessary incentive for entrepreneurs to alter their productive processes in such a manner that production became increasingly roundabout. In an advanced economy capital costs other than interest are so much influenced by wages that it is difficult for these non-interest capital costs to vary independently of labour costs. Therefore the whole burden of adjustment falls on the rate of interest.[2]

Convincing arguments may be offered as to why the rate of interest is unlikely to be a sufficiently strong weapon for the job. Mr. Harrod has discussed such arguments in detail,[3] and we need mention but two which are of especial relevance to our problem. The rate of interest in most advanced countries is very low and has little room to vary. It is virtually impossible therefore for the rate of interest to be falling steadily over long periods of time. The second reason for not putting much confidence in the rate of interest as a device to bring about a more roundabout method of production is that in most advanced countries interest rates are so low that the productive process is dominated by technological considerations. And in an economy that is experiencing a high rate of technological change the uncertainty introduced thereby will surely swamp any effect the rate of interest might have. If we rule out the rate of interest on these grounds, then we are forced to introduce innovations as a source of adjustment to a growing capital–labour ratio.[4]

[1] It seems quite unrealistic to assume a smooth text-book type of isoquant map and the firm moving back and forth along a given curve as input prices change. More realistic is the assumption that as capital costs become lower relative to labour costs *more firms* use capital, and therefore the economy as a whole becomes more capital intensive. The chief difference between the production process in capital-rich countries and capital-poor countries is not to be found in terms of different degrees of " roundaboutness " with respect to all firms. Rather it is found in terms of the fact that a large percentage of the firms in capital-poor countries use virtually no capital, while practically all activity in capital-rich countries makes use of capital. See also footnote 1 on p. 457.

[2] Changes in the composition of output may aid in the adjustment process. However, there seems little reason to assume that the changes in the composition of output act in other than a random fashion with respect to the quantity of capital used in their production.

[3] *Op. cit.*, pp. 556–7.

[4] Hamberg, *op. cit.*, considers the case where wage-rates are falling and the possibility of this resulting in an increase in the capital–labour ratio.

The situation may not be the same in the less-developed countries. In such countries available evidence suggests that the rate of interest is much higher than in the higher-income countries. Changes may therefore be expected to have a greater effect on entrepreneurial decisions with respect to the productive process selected than in countries where the rate of interest hovers around a very low level. In addition, there are other reasons to believe that changes in factor prices may provide the necessary incentive to change the productive process used in low-income countries. The costs of skilled labour and entrepreneurial talent required to produce capital equipment may decline relative to other labour costs as an economy develops. For example, the effects of increasing education accompanying economic development would suggest that skills of all sorts become relatively more abundant, and may therefore decline in price compared to the less-skilled labour. If this occurs, then there is justification in believing that as a country proceeds from a stationary, low-income situation to a situation where income is rising, a direct substitution of capital for labour may be effected by changes in factor prices alone, with no need for innovations.[1] This may continue until the economy becomes well developed, at which point, as noted above, evidence is against factor-price changes doing the job.

However, even if the changing productive process is effected through factor-price changes, it is evident that at some point the capital–ouptut ratio will begin to rise, and the rate of growth of output obtainable with a given saving–income ratio decline. As the capital–labour ratio rises the elasticity of substitution between capital and labour must at some point decline, and will eventually fall below unity. As it falls below unity the elasticity of productivity of capital [2]—ϵ—will also begin to fall, and this must result in a rising capital–output ratio.[3]

Therefore even though a necessary condition for *per capita* output to be rising is that the percentage rate of growth of capital exceed the percentage rate of growth of labour, this condition will itself lead to a situation which will result in a decline in that rate of growth. This is true even though input prices change in such a way that entrepreneurs are induced to effect the necessary alteration in the productive process, and make use of the increasing

[1] This situation is reflected—as we expect from the argument in footnote 1 on p. 456—in capital-poor countries by the existence of highly capitalised firms alongside firms that use the most primitive techniques.

[2] This is defined as $\frac{\partial 0}{\partial k}\frac{K}{0} = \epsilon$. It is evidently the share of output going to capital as well. The assumption that the elasticity of substitution must fall as the capital–labour ratio rises seems well established. See, for example, A. P. Lerner's *Economics of Control* (New York, The Macmillan Co., 1946), Chapter 13.

[3] Evidently all that is necessary for the capital–output ratio to fall is for ϵ to be less than unity, and ϵ is less than unity by the assumption of a two-input production function. But unless ϵ is declining as the capital–labour ratio increases it is conceivable that, if the elasticity of substitution between capital and labour were high enough, something called the marginal ϵ might be unity, and then k would remain constant. A more direct approach, and probably as realistic, is to assume a production function such that

$$\frac{\partial \epsilon}{\partial k}\frac{K}{\epsilon} < 0.$$

supply of capital. Under these conditions we may say that the rate of growth of *per capita* output is declining because the technical relationships governing the system reduce capital's productivity as it increases relative to labour. In order to prevent the decline in the rate of growth of *per capita* income it is necessary to accumulate capital *more* rapidly, *i.e.*, raise the saving–income ratio.[1]

This set of arguments is unlikely to be especially relevant for many underdeveloped countries at the moment. Many such countries are well supplied with underemployed labour on which to draw to complement newly created capital, and those that do not are so capital poor that the economies of scale and external economies that accompany the early increases in capital stock may be expected to outweigh the negative effects on capital's productivity outlined above. However, it is to be emphasised that since s has a ceiling well below unity, the effectiveness of capital accumulation without innovation in raising *per capita* income is limited.[2]

II

We have argued that it is necessary to introduce innovations into the model for two reasons: one, to effect the change in the productive technique necessary to utilise the changing relative supplies of factors. And two, it is necessary to introduce innovations to prevent the growth of *per capita* income from falling.

A further difficulty presents itself at this point. If we rule out factor prices as the determinant of the optimum k, what is the criterion of optimum that we substitute? It is not appropriate to say that the capital–output ratio is now uniquely determined by technology, as this would require an assumption of completely fixed input coefficients, and this assumption we are unwilling to make. But unless some criterion is set up, k becomes indeterminate within the values allowed by technology. We suggest the following solution as both realistic and useful analytically.

We assume that firms seek to earn a given profit rate, Πe, on their capital. The absolute value of the equilibrium rate of return may vary from firm to firm and from industry to industry, but we may assume that potential investors have in mind some rate that they feel is sufficient to justify their outlay. We may say then that if the producers and entrepreneurs are earning Πe they are "content with what they are doing."[3] If the actual profit rate, Πa, is less than this equilibrium rate there is an incentive to reduce investment outlays, and if $\Pi a > \Pi e$ there is an incentive to step up outlays.

[1] *Cf.* H. D. Dickinson, "A Note on Dynamic Economics," *The Review of Economic Studies*, Vol. XXII (3), 1954–55, pp. 173–5.

[2] *Ibid.*, p. 175. At some point capital would presumably become a free good, and the problems of capitalism would be at an end.

[3] This is the way Mr. Harrod defines his warranted rate of growth in *Towards a Dynamic Economics* (London, Macmillan and Co., Ltd., 1948), p. 81.

Now the rate of return on capital is equal to ϵ/k.[1] Thus the firm uses the k which tends to give the rate of return that is deemed equilibrium. If that rate is larger than Πe, then the firm may be expected to seek to increase capital accumulation until k rises and Πa falls to about Πe. And the opposite result would be expected if $\Pi a < \Pi e$, or the firm will seek to introduce a technique that will tend to raise Πa.[2]

With no innovations output is rising at a percentage rate determined by the rate of increase in capital stock and the rate of increase in the labour supply (which we have assumed zero) given the behaviour of the elasticity of productivity, ϵ. We may define the rate of innovations as the rate of growth of output with no change in inputs of capital and/or labour. Therefore if innovations occur, the rate of growth of output depends not only on the rate of growth of inputs, but also on the rate of innovations. But innovations affect not only output, but also the production function itself, and so also the elasticity of substitution, the elasticity of productivity and the profit rate. The net result, as reflected in the behaviour of the rate of growth of output, depends therefore upon the rate of innovations, and the effect of the innovations on the production function in relation to the changes in the supply of capital. And equilibrium growth depends upon the constant achievement of that rate of return on capital that keeps entrepreneurs and producers "contented."

For the moment we assume that the rate of innovations—n—is a given constant. Following customary procedure, we may classify innovations as capital using, capital saving and neutral. We consider each of these types of innovations.

The relationship between the capital–labour ratio and output is indicated by the following diagram.[3] The slope of the curve 1 at F is the elasticity of productivity of capital at this point. Since we have assumed that ϵ declines

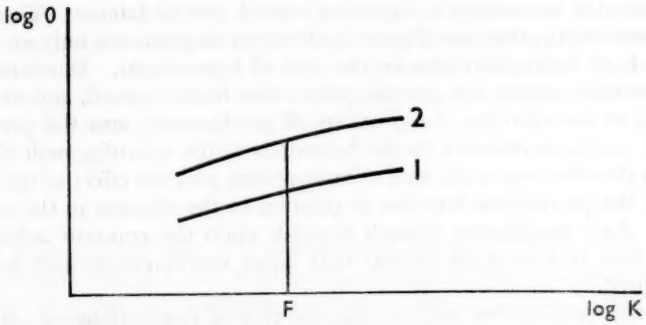
[1] The rate of return on capital is Q/K, where Q is the total return to capital and K is the total stock of capital. Divide the numerator by Y and we get Q/Y, which is the share of total income going to capital, *i.e.*, ϵ. Divide the denominator by Y, and evidently that is the capital–output ratio. The capital–output ratio and ϵ are not independent of each other, but, of course, they may vary in such a way that ϵ/k may change. Evidently in all cases here we must think of capital in terms of the value of congealed labour and waiting, and not in terms of the present value of a discounted stream of outputs. On the problems of capital measurements see the Joan Robinson paper cited in note 2 on p. 455.

[2] The introduction of the profit rate into the model as the determinant of changes in the rate of investment relieves the necessity of relying exclusively on the accelerator. The accelerator has been criticised by many, and surely quite justly in most cases. However, the fact that the rate of output is related to the stock of capital is an important truth, and if the accelerator is used only to indicate that relationship, then much of the criticism of it falls to the ground. The above argument makes investment primarily a function of the profit rate. Decisions to accumulate capital stem from changes in the yield on capital, and the effect on output of the new capital then is determined by the productivity of that capital which is the accelerator or preferably the capital–output ratio. It seems evident that a mere increase in output will not lead to an increase in investment if the profit rate is not being maintained or has not reached that level which entrepreneurs feel is an equilibrium rate. And the profit rate, as we said, depends on the capital–output ratio and the distribution of the total product.

[3] The diagram and classification scheme follow that in Joan Robinson, *op. cit.*, pp. 100–3. *Cf.* also Pilvin, *op. cit.*

as the capital–labour ratio increases, the slope of the curve must decline from left to right.

The innovation raises the whole curve by an amount determined by the rate of innovations, n, up to curve 2. If the curve is raised iso-elastically at each point we may call the innovation neutral as it leaves the share of capital unchanged, and, of course, the share of labour also remains the same. Assuming the labour supply constant, the rate of growth of output at F is $r\epsilon$ (where r is the percentage rate of growth of capital), and if we include innovations it is $r\epsilon + n$. Since by hypothesis ϵ at F_1 is the same as ϵ at F_2, the



behaviour of the profit rate depends upon what happens to k. As ϵ is unchanged by the innovations, so k must remain constant. Therefore F_2 is on the equilibrium-growth path only if $n = r - r\epsilon$; *i.e.*, if

$$(1)\quad n/r = (1 - \epsilon)$$

If $n/r > (1 - \epsilon)$, then k will decline and $\Pi a > \Pi e$. Entrepreneurs will seek to increase the capital stock relative to output, and as Mr. Harrod has described, the system will tend to explode. Of if $n/r < (1 - \epsilon)$ the capital-output ratio will rise, and the downward spiral will begin.[1]

If n is of exactly the right size, k and the profit rate will remain at those values which will tend to keep the system in equilibrium. Under these conditions it is evident that the rate of growth of income will remain constant, *i.e.*, the innovation will exactly cancel the negative effect of the increasing capital–labour ratio on the rate of growth of income.

If the curve is raised so that ϵ at F_2 exceeds ϵ at F_1, then we may speak of a capital-using innovation. In this event the innovation has a twofold effect. In the first place it increases the rate of output by n, and in the second place it increases the elasticity of productivity of capital, thereby raising the share of total product going to capital. The second consequence of the innovations has significant effects on the equilibrium rate of growth.

[1] As we are concerned primarily with the conditions for equilibrium growth, we do not investigate the behaviour of the system once equilibrium has been disturbed except for a brief paragraph in Section IV.

With a higher ϵ the rise in k accompanying a given increase in the capital–labour ratio is less, and therefore the negative effect on the profit rate of the changing k is less. In order to maintain equilibrium in the system it is necessary for ϵ and k to change in exactly the same proportion. In the case of the neutral innovation this meant that the increase in output, n, must make up the entire difference between $r\epsilon$ and r, and k therefore remained constant. Here ϵ rises, and this requires that k also be allowed to rise until $\Pi a = \Pi e$. Since

$$\frac{dO}{dt}\frac{1}{O} = r\epsilon + rd\epsilon + n$$

for $\Pi a = \Pi e$ to obtain it is necessary for

$$\frac{dK}{dt}\frac{1}{K} - \frac{dO}{dt}\frac{1}{O} = \frac{d\epsilon}{dt}\frac{1}{\epsilon}$$

Equilibrium growth then requires the equality $\epsilon' = r - (r\epsilon + rd\epsilon + n)$ (where ϵ' is the percentage rate of increase in ϵ). The equilibrium equation is now

$$(2)\quad \frac{\epsilon' + n}{r} = 1 - \epsilon - d\epsilon$$

Since by hypothesis $\epsilon' > 0$, it is evident that k is rising, and therefore the rate of growth of *per capita* income is declining. Thus if innovations are on balance capital using, the maintenance of equilibrium requires a declining rate of growth of *per capita* income as the capital accumulation process continues. The decline is greater, the greater is ϵ'. If the effect on the output stream of the rate of innovation, *i.e.*, n, is such as to make k constant and maintain the rate of growth of income, it also results in the system being knocked off its equilibrium path in an upward direction. It is clear, then, that n in the case of capital-using innovations must be less than n in the case of neutral innovations.

The analysis of capital-saving innovations is simply the reverse of the capital-using case. Curve 1 is moved up in such a way that each point on curve 2 has a lower elasticity than the corresponding point on the old curve. Now in order to maintain $\Pi a = \Pi e$, the results of the innovation and capital-accumulating process must be such as bring about a constant reduction in the capital–output ratio to match the falling ϵ.

So now, since the rate of growth of income is equal to $r\epsilon - rd\epsilon + n$, the equilibrium equation becomes

$$(3)\quad \frac{n - \epsilon'}{r} = 1 - \epsilon + d\epsilon$$

Since $\epsilon' < 0$, by hypothesis, the equilibrium k is declining, and therefore the rate of growth of *per capita* output is rising. With a falling ϵ, k is rising, and therefore to maintain equilibrium the value of n must be large enough to reduce the k to the extent necessary to maintain the equilibrium profit rate. Thus n must be larger here than in the case of neutral innovations.

It is evident that expression (2) or (3) may be used as a general expression

for the maintenance of equilibrium in all three cases. Thus expression (2) degenerates into expression (1) when ϵ' and $d\epsilon$ are zero, and it becomes expression (3) if ϵ' and $d\epsilon$ are negative. We may regard the constant achieving of the equality indicated by these expressions as supplementary to those conditions laid down by Mr. Harrod and other users of his model, and therefore they add to the difficulties involved in the maintenance of equilibrium growth.[1] More importantly they direct attention to the behaviour of the rate of growth of *per capita* output, and show that a changing rate of growth of *per capita* income is consistent with equilibrium.

The preceding paragraphs assumed r constant and established the equilibrium values of $n + \epsilon'$ and the effect of these values on the rate of growth of output. But evidently r is not independent of the rate of innovations, and especially if innovations are occurring at a fairly steady rate, it is reasonable to assume that firms will make some effort to adjust their investment programs to meet new technological needs. Also a decline in innovations may mean that capital accumulation will be less than if innovations were occurring.

Assume that $n + \epsilon'$ is constant at other than its equilibrium value, but equilibrium is maintained by virtue of adjustments in r. Such an assumption may be justified by supposing that firms foresee the innovations and act in such a way as to maintain the equality $\Pi a = \Pi e$ by changing r.

Evidently if $\frac{n + \epsilon'}{r} > 1 - \epsilon - d\epsilon$ and the system is tending to explode upward, a rise in r will serve to restore equilibrium, and will also serve to raise the rate of growth of *per capita* income. If $\frac{n + \epsilon'}{r} < 1 - \epsilon - d\epsilon$, then r must decline to achieve equilibrium, and this will contribute to a reduction in the rate of growth of income. In both cases the equilibrating movement of r is such as to accentuate the effect of n on the rate of growth of income.

But it is as unrealistic to assume complete equilibration by means of adjustment in r as it is to assume no adjustment in r. We know very little about the determinants of capital accumulation, however, it is clear that there is an upper limit on r and it cannot vary without limitation. And there is little empirical evidence to support the hypothesis that r is adjusted in either direction by entrepreneurs merely for purposes of equilibrating the system. We may conclude that if $n + \epsilon'$ is not of equilibrium value, given r, r will tend to adjust, but not sufficiently to restore and maintain equilibrium. If this is correct, then it means that we need to give further attention to the behaviour of n and ϵ'.

III

The analysis in the preceding section was limited to comparing positions F_1 and F_2, and since the movement along the capital axis was assumed to be very small, we could ignore changes in ϵ due to changes in the capital–labour

[1] Under our assumptions mere neutrality of innovations is *not* a sufficient condition for equilibrium as Mr. Harrod implies that it is under his assumptions.

ratio. Over a long period of time, however, it is necessary to introduce a declining ϵ due to the rising capital–labour ratio into our analysis. Now if ϵ is declining through time for maintenance k must also decline, and this would mean that n must be rising. It will need to rise less rapidly if innovations are capital using than if they are neutral, and more rapidly if innovations are capital saving than if they are neutral.

However, it seems clear that in a relatively uncontrolled economy ϵ has a lower limit considerably above zero, and cannot be presumed to fall indefinitely. Similarly, the assumption that innovations are becoming increasingly effective—that is n rising continuously—does not stand up under historical evidence.[1] If we accept either or both of these propositions about the real world, we may then argue that innovations must on balance be capital using through time in order to counter the decline due to a rising capital–labour ratio. If innovations are not sufficiently capital using, then the system will eventually break down.[2] It is to be noted and emphasised that despite the fact that innovations are capital using, income distribution is relatively unaffected, as the upward effect on ϵ is cancelled by the opposite effect due to the rising capital–labour ratio.[3]

The question we must now consider briefly is whether or not there are reasons to believe that an economy may produce the necessary behaviour of inventions and innovations.

IV

We have shown that for *per capita* income to continue to grow we must introduce innovations into the model. And for the system to continue to function indefinitely the innovations must be of a particular pattern. It is therefore evident that a theory of economic growth must contain, as an endogenous variable, technological change. This we propose to accomplish by introducing invention and innovations into the maximising scheme of the individual firm.

There seems ample justification for doing this. There is substantial evidence that in the advanced countries of the world the innovational process is as much a part of the economic process as is adjustment to a given technology. Entrepreneurs, managers and engineers are learning all the time, and are continuously putting into effect the results of their newly acquired knowledge.[4] Many large firms maintain research and develop-

[1] We know very little about the processes of invention and innovation, and we are, of course, unable to say that anything is *impossible* once we allow innovations in the analysis.

[2] If we allow a falling equilibrium profit rate this will tend to reduce the immediacy of the problem, but it will not eliminate it.

[3] Cf. Mrs. Robinson, *op. cit.*, p. 103, where she concludes that if technical progress is neutral and accumulation goes on at just the rate to keep k constant, the model is free from "internal contradictions."

[4] Professor William J. Fellner, in *Monetary Policies and Full Employment* (Berkeley, University of California Press, 1947), pp. 115–16, suggests that for rapidly growing industries the distinction between movements along a given production function and the setting up of a new function shade into each other. In such circumstances the concept of a "constant state of technology" becomes exceedingly unrealistic. Other writers (*e.g.*, Mrs. Robinson and James Duesenberry) have argued similarly.

ment departments whose very purpose is to provide a constant stream of inventions eligible to be turned into innovations by the policy makers. Not only are many modern firms equipped to direct resources into finding new products and new ways of doing things, but many changes are to a considerable degree foreseen. The policy maker is able to do two things. First, he is able to make decisions as to current behaviour on the basis of information with respect to inventions and innovations that are in the wind. And secondly, he is able to consider his technology a variable, and therefore he may adjust it as well as his quantity of output, the price of his product or the rate of his expansion. Even in firms that have no formal research section, leaders are in general aware of the direction and approximate pace of changes in technical knowledge through trade associations and trade journals.

These facts contribute to the possibility of smooth adaptation to a changing technical environment. This adaptation process is reflected not only with respect to saving rates as noted above, but with respect to other adjustments as well. In particular the disruption and other problems imposed by the specificity of capital equipment may be minimised, and an appropriate depreciation and obsolescence policy becomes more nearly achievable.[1]

We may conclude therefore that inventions and innovations should be looked upon as part of the normal routine of business operation. It follows, then, they are subject to the maximisation scheme that governs the firm's policy decisions. Indeed, in many instances expenditure on research is treated as an outlay which results in revenue just as any other outlay made by the firm is assumed to do.[2]

Inventions are thus the result of a conscious policy decision to allocate resources to inventive activity, and innovations made possible by these inventions will presumably occur when they can be effected in such a way as to increase profits. More clearly we may say that an innovation in the form of a new product will be made if the yield on the capital required to turn out the product equals Πe. And if the innovation is in the form of cost reduction in the production of old products, it will be made if it serves to prevent $\epsilon/_k$ from declining. If it results in a rise in $\epsilon/_k$, then investment will be forthcoming until the profit rate is restored to its equilibrium value.

This set of ideas suggests the following implications. Innovations are necessary for Harrodian equilibrium. Firms in a modern advanced society consider invention and innovation as an essential part of the routine of operation. Since some foresight of technical change is possible, adjustment may be smooth enough to provide no disturbance to the equilibrating process. However, despite the fact that inventing and innovating are part of

[1] For similar and fuller discussion of this argument see Gordon F. Bloom, " Wage Pressure and Technological Discovery," *American Economic Review*, September 1951; W. Rupert Maclaurin, " Technical Progress in Some American Industries," *American Economic Review Papers and Proceedings*, May 1954; Carolyn Shaw Solo, " Innovation in the Capitalistic Process: A Critique of the Schumpeterian Process," *Quarterly Journal of Economics*, August 1951; A. P. Usher's *History of Mechanical Inventions*, Revised Edition (Cambridge, Harvard University Press, 1954), *passim*; and *Technological Trends and National Policy*, United States National Resources Committee, Washington, 1937, *passim*.

[2] Solo, *op. cit.*

the routine, they also are not subject to complete control. More than other aspects of business decisions, decisions to invest in "inventions" are accompanied by a large random component, and therefore may supply the shock necessary to knock the system off the equilibrium path. This shock is even more likely when it is recalled how rigorous the equilibrium requirements are. But once the system has been knocked off its equilibrium path by an innovational mistake, and the destabilising factors discussed by Mr. Harrod begin to be effective, innovations will tend to act in a stabilising manner.

If the innovation is in an upward direction from the equilibrium path, entrepreneurs are having difficulty accumulating capital at a rate that would equate the equilibrium profit rate with the actual profit rate. Under these conditions we may expect firms to seek ways of utilising their capital stock more effectively. This is to say they seek capital-saving innovations, which will enable a larger output to be achieved with a given capital stock. This means that a given rate of capital accumulation will result in a greater increase in the rate of output, and will therefore serve to reduce the upward spiral. When the system is knocked off the equilibrium path in a downward direction the actual profit rate is less than the equilibrium profit rate. Given the elasticity of productivity the capital–output ratio is too high.[1] The pressure on innovations will be of a kind that tends to increase the use of capital in the productive process.[2]

In addition to the short-run effect of the role of innovations in the growth process, the question may also be asked as to whether or not inventions are likely to be forthcoming at the required rate and in the required direction over an indefinite period of time. Despite the efforts of entrepreneurs, managers and engineers to discover new products and new ways of making old products, there is no necessity that such efforts will be rewarded. The literature has little to say on this subject in a formal, analytical way, and revealing data are hard to come by.[3]

There does seem evidence, however, to support the view that the rate of inventions and innovations is higher in new industries than in old, and innovations are likely to be capital using in new industries and capital saving in old-established industries. Such an hypothesis may be supported in several ways. We may indeed say that one of the reasons why new industries and new firms come into being is due to a belief on the part of investors that the

[1] It may be worth noting explicitly that innovations may be depressive as well as stimulating. In terms of the maintenance of short-run equilibrium there seems no more reason to assume them to be of one kind rather than the other.

[2] We do not argue that the turning points of the cycle should be explained in terms of the behaviour of innovations, although it is a simple matter to construct a model where this is the case.

[3] This is not to say that economists have not considered the effects of inventions and innovations on the economic process. Innovations, of course, are considered in detail by Schumpeter, and others have used them to account for stagnation in mature economies. We regard inventions as the source of innovations, and therefore their behaviour of more importance in the long run than that of innovations. Economics at the moment offers no *theory* of inventions in the sense of an explanatory system accounting for the pattern and rate of changes in technical knowledge. Presumably many economists are willing to assume the problem beyond the limits of the discipline. As we have indicated in the text, this is a position we are unwilling to accept.

productivity curve of their new firm is higher and more steeply sloped than those of existing firms.

New firms are much more interested in finding a place in the market as opposed to maintaining the *status quo*. Thus the incentive to seek new inventions and put them into effect immediately may be greater in new enterprises than in old. Furthermore, capital requirements are likely to be greater with respect to those innovations that are made in the period when the industry is new and catching up with the economy than when its growth is determined by the growth of the total economy. We may also expect that business leaders of new industries are optimistic as to the future growth of their enterprises,[1] and willing to assume the responsibilities that commitments involve. And perhaps most important of all, one may argue that the possibilities for technical progress in a single productive activity are limited. The more improvements that are made in the technical aspect of a given process, the less scope there may be for further improvement, and therefore we may expect the rate of technical progress in old industries to taper off.[2]

These conjectures as to the degree of success in the inventive and innovational activities of firms suggest the importance of new industries and new products to the satisfactory functioning of a highly capitalised economy. If new industries are not forthcoming, then we suggest that the problems following from the analysis in Sections II and III may become severe enough that the economy has chronic difficulty maintaining *per capita* growth and equilibrium. If this kind of reasoning is correct, then among the other policy aims of such an economy would be that of maintaining a market structure that permitted ease of entry of new firms with new blood and new ideas into old industries, and that of simplifying the development and exploitation of new products.

V

We have shown that inventions and innovations are crucial to the growth process. They are a necessary condition for equilibrium growth (in the Harrod sense of equilibrium), they also contain a likely source of disturbance to the system, and also provide a source of equilibrating pressure once the system has been knocked off its equilibrium path. Over the long run we have shown that a particular pattern as well as rate of innovations is essential to the internal consistency of an economy. Finally, we suggested a way of introducing inventive and innovational activity as an endogenous variable into the economic argument, and offered a few hypotheses as to the likelihood of the necessary behaviour of innovations being accomplished.

HENRY J. BRUTON

Yale University.

[1] Nicholas Kaldor, "The Relation of Economic Growth and Cyclical Fluctuations," ECONOMIC JOURNAL, March 1954, attaches a great deal of importance to "optimism" among entrepreneurs as a factor explaining economic growth.

[2] Great emphasis is given to this point by Arthur F. Burns (*Production Trends in the United States since 1870* (New York, National Bureau of Economic Research, 1934), p. 141) in explaining why individual industries seem to experience retardation in their rates of growth.

THE REGIONAL LOCATION OF INDUSTRY: AN EMPIRICAL STUDY BASED ON THE REGIONAL TABLES OF THE 1948 CENSUS OF PRODUCTION

1. Introduction

The policy of regional industrial diversification exemplified by the Government's treatment of Development Areas has been extensively discussed in the past few years and has its staunch supporters and severe critics. The critics have, for the most part, argued that the policy involves the development of industry in areas which are not necessarily the most suitable ones and is, therefore, bound to have an adverse effect on the national income. This view is strongly held by Mr. A. C. Hobson,[1] who stresses the economies of location in the great industrial belt of the midlands and argues that "if our aim is to put every new factory in its most economic location there is every indication that most of them will be situated within or near the great belt."[2] The danger of Development Area policy is, then, that it is likely to lead to a "serious loss of efficiency."[3] This broad conclusion is unsupported by any empirical evidence on the efficiency of industrial location in different areas, and, indeed, much of the discussion of this important subject has been similarly hampered by lack of hard facts. The purpose of the present article is to see what light on the problem is shed by the regional data of the 1948 Census of Production.

It must be admitted that the data which these regional tables (Table 5 in the Final Reports) contain are not wholly adequate for the present purpose. Ideally what is required are data relating to the costs of establishing *new* factories in different locations and to the efficiency of such establishments in those different locations, *i.e.*, to certain *marginal* costs and *marginal* productivities. The Census tables refer to the production of *all* establishments in a region, and all that can be obtained from aggregated figures of this type are various *averages*. Such data will give information on industrial structure as it has developed in the past, but only the most tentative conclusions may be drawn regarding development in the future. However, since these data are the most comprehensive available relating to the regional location of different trades in Great Britain, it seems worthwhile to examine them to see what information they can provide on the suitability of different regions for industrial development.

2. Basic Data and Measurements

The regional tables of the Census of Production show for each trade the number of establishments, the value of output, cost of raw materials and wages and salaries paid. Data are given separately for the eleven standard

[1] A. C. Hobson, "The Great Industrial Belt," Economic Journal, Vol. LXI, No. 243, September 1951, pp. 562 *et seq.* [2] Hobson, *op. cit.*, p. 574. [3] Hobson, *loc. cit.*

regions.[1] These regions, which have been defined for administrative purposes, cover large geographical areas and have the disadvantage that they do not coincide with natural economic regions or industrial belts. Further, in the Census tables it has occasionally been necessary to combine the data for two or more regions in order to avoid disclosure of information relating to individual producers, and it is not possible to make a detailed study of the regional location of the trades affected.[2]

The difficulty of obtaining from such data any measurement which will adequately reflect regional advantages or disadvantages for industrial development is considerable. Size of establishments and capital expenditure, which would be expected to affect efficiency, are not analysed by regions, nor is it possible to obtain on a regional basis " unit costs " of particular outputs. The only way of estimating a " rate of reward " is by relating value figures to the labour force. This method has been used in the following discussion and the relative profitability of different trades is measured by the *net margin per head.* The excess of gross value of output of each trade over the cost of raw materials and amounts paid in wages and salaries may be called the net margin, and this excess divided by the total number of persons employed gives the net margin per head. When using this measure the following two considerations must be borne in mind: first, the net margin includes besides profits a number of costs such as rents, rates, maintenance and depreciation, and other overheads which, though they might vary from region to region, cannot be eliminated from the net margin. Second, the composition of the labour force (*i.e.*, combination of men and women of different ages and skills) differs widely between trades and, possibly, though to a lesser extent, in the same trade in different regions; the measurement of net margin per head requires, however, that all members of the labour force in different trades and in different regions be considered as equal " labour units." The net margin per head is, therefore, only a very rough estimate of the average return from employing labour in different trades or regions, but it is the best measure which can be obtained from the data.

In order to classify the Census trades according to their regional concentration or dispersion use will be made of *location coefficients* of a type devised by Professor Sargant Florence.[3] To calculate these coefficients the " location standard " taken was the proportionate distribution by standard regions of the population of Great Britain aged fifteen years and over in 1951.[4] This distribution is given in percentage form in the first

[1] The eleven standard regions of Great Britain and the abbreviations which will be used for them in the tables which follow are: England; Northern (N.), East and West Ridings of Yorkshire (E. & W. Rid.), North Midland (N.M). Eastern (E.), London and South-eastern (Lond. & S.E.), Southern (S.), South-western (S.W.), Midland (M.), and North-western (N.W.). Wales and Scotland (Scot.) each constitute separate regions.

[2] These are, for the most part, very small trades or trades in which the bulk of production is concentrated in one or two regions.

[3] P. Sargant Florence, *Investment, Location, and Size of Plant*, p. 34.

[4] Taken from the 1% sample tables of the 1951 Census of Population.

line of Table I (below). From the Census of Production tables the proportionate regional distribution of employment in each trade can be obtained. The algebraic sum of the deviations of " trade proportions " minus " population proportions " is necessarily zero. The sum of the *positive* deviations is taken as the location coefficient.[1] For a trade distributed in the same way as the population the coefficient is zero, and it has an upper limit of unity.

In the following sections net margins per head and location coefficients will be used to investigate the characteristics of trades in different location groups and to find whether there is any systematic regional pattern in the variations in net margins per head of the Census trades.

3. General Location Considerations

The 1948 Census of Production covers 156 separate trades. The analysis which follows will be concerned only with the 139 of them classified as manufacturing trades and which account for 75% of the total net output and 72% of the total employment of all trades covered by the Census. The regional distribution of employment in manufacturing trades and that of the population aged fifteen years and over (used as the location standard) is given in Table I.

Table I

Regional Distribution of Population and Employment in Manufacturing Trades

	Standard regions.										
	N.	E. & W. Rid.	N.M.	E.	Lond. & S.E.	S.	S.W.	M.	N.W.	Wales.	Scot.
(*a*) Distribution of persons aged 15 years and over, % . .	6·3	8·4	6·8	6·4	22·8	5·5	6·3	8·9	13·2	5·3	10·2
(*b*) Distribution of employment in manufacturing trades, % .	5·3	10·8	7·8	4·4	18·8	3·3	4·0	14·1	18·4	3·3	9·9
(*c*) (*b*) as % of (*a*) . . .	84	129	115	69	83	60	64	158	139	62	97

Sources: (*a*) Census of Population 1951: 1% sample tables.
(*b*) Census of Production 1948.

It can be seen that the two distributions are closely similar. The percentages in the last line may be regarded as an index of the regional concentration of manufacturing industry; [2] this shows that the East and West Ridings of Yorkshire, North Midlands, Midlands and North-west are relatively manufacturing intensive regions and that, at the other end of the scale, manufacturing industry in the Eastern, Southern and South-western

[1] The only difference between these coefficients and those of Sargant Florence is that Sargant Florence (*op. cit.*) uses as his location standard the distribution of all employment covered by the 1935 Census of Production (all his calculations are from the 1935 Census). Since discussion on industrial diversification is customarily conducted in terms of employment, it seemed more satisfactory for the present purpose to take as the location standard the distribution of the labour force available for employment, and the population aged fifteen years and over was chosen for this purpose. Effectively there is very little difference between the two standards.

[2] See Section 5 below.

regions and Wales is not so heavily concentrated. There are, however, quite considerable industrial pockets in these latter regions—particularly in Wales.

Location coefficients have been calculated for all manufacturing trades where sufficient data were given in the Census. Of the eighteen trades for which the data were inadequate five have been assigned the coefficients obtained by Professor Sargant Florence from the 1935 Census of Production. For comparative purposes six " location groups " were distinguished and the location coefficients of the trades within these groups are given in col. 2 of the Appendix.

It might be expected on *a priori* grounds that trades which, in the past, have been profitably developed in a large number of different locations would figure largely in Development Area policy or in a programme of regional industrial diversification. Such trades would, necessarily, have low location coefficients and for the present purpose they may be limited to those listed in the first three location groups in the Appendix, *i.e.*, to trades with location coefficients less than 0·4. These groups contain most of the food trades, chemical trades, engineering and electrical trades, plastics and artificial fibres. In order to find what part is played by such trades in post-war regional industrial development in Great Britain reference may be made to a number of special articles devoted to this subject which have appeared in various issues of the *Board of Trade Journal*.[1] The information which they contain is not always as useful as might at first sight appear because the articles do not list all the separate trades newly developed in the various regions and because in some instances *portmanteau* references are made which cannot be directly related to the individual trades defined in the Census. But it will be clear from the following examples that in those regions where systematic industrial diversification is taking place the trades of a type just enumerated are of great importance.

The Development Areas.[2] Among the trades introduced to these Areas since the end of the war are: *Merseyside:* Food trades; British Celanese (synthetic fibres); plastic products; synthetic resin; light engineering and constructional engineering. *South Wales Valley:* British nylon spinners; chemicals and basic plastics; radio and television.[3] *North-east Coast:* Chemicals; pharmaceutical products; nylon and rayon fabrics; electrical equipment; light engineering goods and plastics. *West Cumberland:* Synthetic detergents; scientific instruments; precision engineering equipment, and processed foods.

[1] Articles describing progress in the Development Areas were published during December 1950 and January 1951 in various issues of the *B[oard] of T[rade] J[ournal]*. The first of the series dealing with industrial developments in the standard regions appeared in the *B. of T.J.*, December 1, 1951. Up to November 27, 1954, twenty-two articles had been published.

[2] Details in this paragraph have been taken from *B. of T.J.*, December 2 and 9, 1950.

[3] A more detailed list of thirty-two trades introduced into this area since the end of the War is given in the *B. of T.J.*, December 30, 1950, p. 1,102. Over twenty of these trades have location coefficients less than 0·4.

Southern Region. The post-war developments in this region (which, as shown in Table I, has the lowest regional index of industrial concentration) is described in the following terms: " Firms associated with the vehicle, engineering or chemical industries represent a high proportion of all the post-war movement of new industry into the region. Moreover it is these industries which have shown the biggest relative and absolute expansion in the regional economy." [1]

North-west Region.[2] The general post-war trend is towards greater diversification. Established industries having shown considerable post-war expansion are textile and electrical engineering; glass; metals; chemicals; and those concerned with the manufacture of commercial vehicles, locomotives and aircraft. The electrical machinery industry has emerged as the largest single branch of engineering. Among newer industries plastics and the evolution of artificial fibres are of growing importance.

Midlands Region.[3] The greatest post-war expansion has been in engineering, including light engineering trades; electrical gear; and motor-car and allied industries.

North Midlands Region.[4] Among the expanding industries in this region are certain textile trades using synthetic fibres; engineering; chemical industries and plastics.

Eastern Region.[5] In this region the development of wireless and television and certain food trades is important.

These examples are by no means exhaustive, and it must not be inferred that trades of the above type account for all the post-war industrial expansion taking place in the various regions; there are also instances of the development of basic, highly localised trades, *e.g.*, trades in the woollen industry in the East and West Ridings of Yorkshire.[6] But the examples give clear evidence of the present importance of trades with low location coefficients in the Development Areas and in general industrial diversification, and provide a background to which the following discussion can be related.

Returning to the Census material, some of the characteristics of these trades may be examined. First, the relative importance of the trades in the six location groups can be seen from Table II, which shows the concentration of employment and net output in each of the groups.

By either criteria the first three groups, those trades with moderately low location coefficients (*i.e.*, less than 0·4), are the most important in the economy, accounting for approximately 70% of employment and net output in manufacturing industries. Thus it is clear that the bulk of manufacturing activity is in trades which are fairly well dispersed over Great Britain.

[1] *B. of T.J.*, April 4, 1953, p. 665.
[2] *Ibid.*, December 1 and 8, 1951.
[3] *Ibid.*, May 31, June 7 and 14, 1952.
[4] *Ibid.*, November 29, December 13 and 27, 1953.
[5] *Ibid.*, January 2 and 9, 1954.
[6] *Ibid.*, December 15 and 29, 1951.

The figures in cols. 3 and 4 in the Appendix show that the sizes of the trades in each group vary considerably. The average trade size in

TABLE II

Employment and Net Output in Manufacturing Trades by Location Groups

	Location coefficients.						
	Less than 0·2	0·2–0·3.	0·3–0·4.	0·4–0·5.	0·5–0·6.	0·6 +.	Unknown.
Percentage of total employment in group . .	18·6	29·7	21·7	8·9	7·6	12·6	0·9
Percentage of total net output in group . .	19·9	27·8	22·6	9·5	7·6	11·5	1·1

each group has been calculated by dividing the proportion of total employment and total net output in each group by the number of trades in the group. The results are given here in ratio form for ease in comparison.

TABLE III

Average Trade Size by Location Group

(Size in group with location coefficients less than 0·2 = 100)

	Location coefficients.					
	Less than 0·2.	0·2–0·3.	0·3–0·4.	0·4–0·5.	0·5–0·6.	0·6 +.
Average size ratio based on employment	100	100	73	42	41	60
Average size ratio based on net output	100	88	72	43	38	52

The figures show clearly that, measured either in terms of employment or net output, the most widely dispersed trades are also, in general, the largest ones. Excepting the most highly localised trades, average trade size falls off fairly sharply as location of the trades becomes more concentrated.

The average size of establishment for each trade has been obtained by dividing the numbers employed by the number of establishments in the trade. The results are given in col. 5 of the Appendix. It can be seen that the average establishment sizes in each location group vary over a fairly wide range. For comparative purposes a "representative" measure may be obtained by taking the median of the average establishment sizes for each group.

One should not read too much into such rough representative measures, but the results do suggest that, for the first four groups, there is a positive association between average establishment size and the degree of location. Professor Sargant Florence, who has made a much more detailed examination of the relationship between location and size of plant from the 1935

Census of Production, reaches a similar conclusion; he writes that, " among the not highly localized industries, the smaller the industry's size of plant, the less its localization." [1]

TABLE IV

" *Representative* " *Establishment Size of Trades by Location Groups*

	Location coefficients.					
	Less than 0·2.	0·2–0·3.	0·3–0·4.	0·4–0·5.	0·5–0·6.	0·6 +.
Medians of establishment sizes, persons	60	91	126	130	124	134

The results obtained from this general survey are as follows: The bulk of employment in Great Britain is in trades which, geographically, are fairly well dispersed (*i.e.*, trades with location coefficients less than 0·4). Apart from their importance as a group, they are, by and large, the largest individual trades and are associated with the smallest establishment sizes. Not surprisingly, therefore, the policy of industrial diversification in Great Britain relies heavily on such trades. Since their widespread location has proved profitable in the past, it may be suggested, provisionally, that there are unlikely to be significant differences in the suitability of the various regions for the location of these trades, and unlikely, therefore, that regional industrial diversification and Development Area policy will necessarily depress the size of the real national income. This view will be examined more closely in the following sections.

4. Net Margins per Head

The figures in col. 6 of the Appendix show great variation between the net margins per head in different trades. They range from virtually zero in Flax Processing, £107 in Motor Vehicles and Cycles (Repairing) and £115 in Small Arms to £801 in Cement, £940 in Brewing and Malting and £1,174 in Spirit Rectifying and Compounding. The money value of the net margin per head necessarily reflects special characteristics of individual trades (*e.g.*, the degree of capitalisation, the nature of the market, etc.) and variations in net margins per head must be explained in terms of these different characteristics. From the available data only one characteristic can be isolated, namely the degree of concentration or dispersion of location as measured by the location coefficient. Using net margin per head as an index of profitability it is important to find if there is any systematic relationship between the net margins per head of different trades and their location coefficients. This procedure will indicate whether there is any systematic inducement to develop those trades which are broadly spread over the country or whether those in which strong location factors operate seem to be the most attractive.

Data relating to 129 manufacturing trades were plotted on a graph

[1] P. Sargant Florence, *Investment, Location, and Size of Plant*, p. 39.

having net margins per head and location coefficients as co-ordinates. It was quite clear on inspection of the scatter diagram that, taking all trades together, there was no systematic association between the variables. The same data were examined by industrial groups of trades (*e.g.*, chemical trades, food trades, engineering trades, etc.[1]) but even within these relatively homogeneous groups there was no indication of systematic relationship between the variables. Finally, the averages of the net margins per head and location coefficients of each industrial group were calculated as giving " typical " group measurements, and the relationship between these averages was examined. Again the scatter of points seemed quite random.

It may be concluded with some certainty that there is no systematic association between net margins per head and trade location coefficients either between trades in the same industrial group or between industrial groups. Thus, if net margins per head are used as indicators to the most profitable lines of industrial development there is no expectation that choice will be restricted to trades in any one of the location groups. Turning the argument round it follows that, to the extent that regional industrial diversification involves the development of trades of a type with low location coefficients, there is no evidence that trades will be developed in which the reward for employing labour has, in the past, been shown to be systematically low.

Apart from variations in net margins per head between trades the data disclose considerable variations in regional net margins per head in the same trade. These regional variations can only be examined for trades which are located in several regions and for which separate regional data can be obtained. The first consideration eliminates highly localised trades (such as cotton spinning), and the second eliminates a number of small trades for which data for several regions have been combined in the Census tables. In what follows attention has been confined to trades for which adequate regional data could be obtained for at least five regions. For convenience these will be referred to as *ubiquitous* trades.[2] Ninety-four out of the 139 manufacturing trades (*i.e.*, approximately two-thirds of them) rate as ubiquitous, and their importance is revealed by the fact that between them they account for 91% of all employment in manufacturing trades. As would be expected, they are trades with low location coefficients; seventy-five out of the ninety-four having coefficients less than 0·5. It will be appreciated that conclusions can only be related to trades which, through time, have developed as widely located ones. Nothing can be said of the effect of extending the regional development of trades at present highly concentrated in a few regions.

An attempt was made to investigate whether the degree of variation in regional net margins per head of the separate trades was associated with

[1] Nine groups were distinguished, but the number of trades in each group differed considerably. Some groups were represented by only a few trades.

[2] This convenient expression has been borrowed from Sargant Florence (*op. cit.*, p. 41), but the definition of ubiquitous trades in the above discussion is not that used by him.

their regional concentration or dispersion. The former variable was measured by the coefficient of variation of the regional net margins per head in each trade.[1] A scatter diagram of points having as co-ordinates the coefficients of variation of the regional net margins per head and the location coefficients of the ubiquitous trades revealed a broad positive association between the variables. There was a number of outlying points, but, in general, the picture was that trades for which the coefficient of variation of regional net margins per head was low were associated with lower location coefficients (*i.e.*, more widely dispersed trades) than those for which it was high. The relationship between the variables was also examined for several industrial groups of trades. The positive association just noted was disclosed by the food and drink trades, engineering trades, certain metal trades and the textile trades; it was also suggested by certain other smaller groups, but these comprised so few ubiquitous trades that no firm conclusions could be drawn. The group of chemical trades was the most important one for which the association was not shown.

It might have been expected on *a priori* grounds that those trades which, through time, it has been found profitable to develop in a number of widely dispersed regions would also be those trades for which specific regional advantages or disadvantages are of least importance. The empirical results—tentative though they must be on this sort of data—are consistent with this view. The conclusion is an extremely important one in connection with a policy of industrial diversification. It means that the trades which have been shown to be most suitable for such a policy are also those for which the average rate of reward from employing labour (measured by the net margin per head) varies least from region to region. Thus the loss to the national income—if, indeed, there should be any loss at all—incurred by encouraging the location of trades in certain regions is likely to be less for these trades than for others.

5. Regional Concentration

The data in the regional tables of the Census are not sufficient to make possible any comprehensive explanation of the variations in regional net margins per head. It is, however, interesting to see what light they shed on the view that areal differences in location are important in terms of external economics accruing from concentration. The measurement of the variables presents serious obstacles, and it must be freely admitted that it is not possible to derive a wholly satisfactory measure of regional industrial concentration from Census material. But rather than abandon the attempt the percentages in the third line of Table I (above) may be used as an index of regional concentration of manufacturing industry. The second variable was obtained by expressing, for each trade, the net margin per head in the regions as a percentage of the national net margin per head for the trade. For convenience these last measurements may be referred to as " regional

[1] The coefficients of variation are given in col. 7 of the Appendix.

net margin percentages." Five main groups of manufacturing trades were considered, food, chemicals, engineering, certain metal trades and textiles, and for each of these groups the "regional net margin percentages" of the individual trades were plotted against the index of regional concentration of manufacturing industry. In none of the five groups was there any systematic association between the variables.

Next, the effect of the regional concentration of individual trades was considered. For each trade "regional trade concentration percentages" were obtained by expressing the regional percentage of employment in each trade as a proportion of the regional percentage of the total population aged fifteen years and over.[1] For each trade in the five industrial groups noted above the relationship between "regional net margin percentages" and "regional trade concentration percentages" was examined. The five scatter diagrams each suggested that the two variables were independent. There was no indication that a lightly concentrated trade in any region was systematically associated with a lower net margin per head than the same trade in other regions where it was relatively more heavily concentrated.[2]

The implication of these results is that variations in regional net margins per head cannot be explained in terms of regional concentration of manufacturing industry in general or in terms of differential regional concentration of individual trades. The logical extension of the argument would be to conclude that regional differences in concentration are not sufficiently great markedly to affect regional suitability for industrial development. However, this view is suggested by somewhat fragile evidence because industrial belts and major industrial concentrations are not necessarily coincident with the standard regions; indeed, there may be several small belts in any one region. But, on the evidence available and given the methods employed to measure regional concentration, the advantages or otherwise of industrial belts within regions do not seem great enough to determine the pattern of regional variations in net margins per head of different trades.

6. Regional "Comparative Advantages"

To conclude this examination of the Census of Production data the net margins per head of trades in individual regions will be considered in order to find whether net margins per head are systematically high or low in particular regions, *i.e.*, whether variations in net margins per head suggest that any regions are at a systematic disadvantage as regards industrial location. The variation in net margin per head of different trades is so great that regional net margins per head may only be compared in the same trade. In order to obtain a fair basis for comparison the following discussion has been restricted to the ninety-four ubiquitous trades referred

[1] *E.g.*, the Northern region has 6·3% of the population of Great Britain aged fifteen years and over (see Table I above). The region also has 7·2% of the total employment in Grain Milling. The regional concentration percentage for this trade is given by $(7{\cdot}2/6{\cdot}3) \times 100 = 114$.

[2] It is the efficiency of the "establishment" rather than the "industry" or "trade" which matters; even in thinly industrialised areas the scale of development of a trade may be enough to make for efficient establishments.

to in Section 4 (above), *i.e.*, those trades for which reliable data could be obtained for at least five regions.

In each trade the net margin per head of each region was compared with the arithmetic average of the net margins per head in all regions. In this way it was possible to classify the ubiquitous trades in each region into those with net margins per head greater than and those with net margins per head less than the trade average. An analysis of employment in these trades was made, and the results are summarised in Table V.

TABLE V

Summary Data relating to Ubiquitous Trades in the Standard Regions

	Standard regions.										
	N.	E. & W. Rid.	N.M.	E.	Lond. & S.E.	S.	S.W.	M.	N.W.	Wales.	Scot.
(*a*) No. of ubiquitous trades .	77	79	79	73	86	68	68	76	90	67	89
(*b*) No. of ubiquitous trades with n.m.p/h [1] above average .	30	40	39	43	60	35	29	38	45	15	28
(*c*) (*b*) as % of (*a*) . . .	39·0	50·6	49·4	58·9	69·8	51·5	42·7	50·0	50·0	22·4	31·5
(*d*) Employt.[2] in ubiquitous trades with n.m.p/h [1] above average as % employt.[2] in all ubiquitous trades in region . .	16·6	75·9	70·4	63·8	66·8	58·0	42·6	65·2	60·1	19·3	28·0
(*e*) Employt.[2] in all ubiquitous trades as % of total employt.[2] in all manufacturing trades in region	95·2	91·7	87·5	92·1	92·0	93·4	87·2	92·2	81·2	72·9	86·4

[1] Net margin per head. [2] Employment.

The figures in line *a* show that there is a fair diversity of ubiquitous trades in all of the regions. With the exception of the North-western region and Wales, these trades account for approximately 90% of all regional employment in manufacturing trades (line *e*).[1]

On a comparative approach it would be advantageous to the national income to develop in the separate regions those trades for which the regions possessed relative advantages. Identifying such trades with those for which regional net margins per head are greater than the average, the extent to which they have been developed in the regions can be measured by the percentage which employment in the "above-average" trades forms of all regional employment in the ubiquitous trades (line *d*). On this basis it can be seen that the East and West Ridings, North Midlands, Eastern, London and South-eastern, Midland, and North-western regions show the most satisfactory patterns of regional industrial development. In these regions over 60% of employment in the ubiquitous trades is in those for which regional net margins per head are greater than the average. On the other hand, Wales, Scotland and the Northern region have less than 30% of employment in such trades. The relevant percentages for these three regions

[1] In the North-western region the percentage is low because of the importance of some highly localised textile trades. In Wales there are more ubiquitous trades than those shown in the table, but in the Census details have been combined with other regions, and the trades had, therefore, to be omitted.

in line *d* are less than the corresponding percentages in line *c*, indicating that the industries for which the regions possess a relative advantage are, on the average, among the smallest employers of labour. For all other regions (excepting London and the South-east) the percentages in line *d* are equal to or greater than those in line *c*. It is particularly interesting to note that Wales, Scotland and the Northern region are the three regions in which the most important Development Areas are sited. The results show that, apart from the heavier incidence of unemployment in these regions associated with the Development Areas, the basic structure of industry is less satisfactory from the viewpoint of the national income than that of the other regions.

Regional diversification of industry implies, *inter alia*, the introduction of new industries to regions, as well as the development of some of the existing ones. Hence detailed recommendations for such a policy cannot be made from Census data, which is, in effect, a summary of developments which have taken place in the past. Nevertheless, Table V shows (line *b*) that there is a number of ubiquitous trades in each region for which the regional net margins per head are greater than the average. A detailed study of such trades might well give some pointer to the sort of new trades which might profitably be developed in particular regions.

7. Conclusions

It has been shown that the most important trades at present associated with regional industrial diversification and Development Area policy are trades which, in the past, have been suitable for widespread development throughout Great Britain. No association was found between the net margin per head of trades and their regional concentration or dispersion, but regional variations of net margins per head within trades seemed to be least for the widely located trades. With regard to location factors, there was no evidence that differential industrial concentration in the regions could explain regional variations in net margins per head. Nor was there any evidence—and this is important—that any regions were in all cases at a systematic disadvantage for industrial location: in all regions there were some trades in which the net margin per head was greater than the average and, therefore, in all regions scope for the profitable development of industry.

The importance to be attached to these conclusions must be governed by the quality of the data from which they have been drawn. Nevertheless, a pattern has emerged, and it is at variance with Mr. Hobson's view that "If new factories are located far away from the (industrial) belt they are likely to lose in efficiency, and, consequently there will be a lowering of the standard of living."[1] On the contrary, the evidence lends support to Development Area and industrial diversification policy and indicates that it is proceeding on right lines.

R. J. Nicholson

University of Hull.

[1] Hobson, *op. cit.*, p. 574.

APPENDIX

Manufacturing Trades Classified According to their Location Coefficients

(1) Trade.[1]	(2) Location coefficient.	(3) % of total employment.[2]	(4) % of total net output.[3]	(5) Average number employed per establishment.	(6) Net margin per head, £.	(7) Coefficient of variation.
Trades with Location Coefficients Less than 0·2						
Bacon Curing, etc.	0·16	0·195	0·223	52	343	20·2
Bread & Flour Confectionery	0·13	1·172	1·265	58	304	8·2
Brewing & Malting	0·12	0·763	1·803	102	940	16·2
Building Materials	0·09	0·618	0·688	60	259	13·4
Canvas Goods	0·18	0·126	0·108	49	233	18·2
Coal-tar Products	0·18	0·066	0·096	78	443	24·5
Glue, Gum & Paste	0·13	0·054	0·073	80	384	19·8
Grain Milling	0·17	0·312	0·485	86	501	22·6
Mechanical Engineering, general	0·14	4·934	5·088	166	220	11·9
Mechanical Engineering, repairing	0·09	0·320	0·278	36	151	20·0
Milk Products	0·16	0·481	0·505	77	275	14·2
Motor Vehicles, etc., repairing	0·08	0·769	0·602	55	107	17·1
Preserved Fruit	0·15	0·473	0·486	138	320	22·2
Printing & Publishing	0·17	1·804	1·830	67	221	11·9
Soft Drinks	0·11	0·219	0·292	39	449	24·3
Soft Furnishings	0·18	0·145	0·132	50	232	20·8
Timber	0·09	0·973	0·928	49	214	9·7
		13·424	14·882			
Trades with Location Coefficients 0·2–0·3						
Aircraft Manufacturing	0·23	1·439	1·344	687	136	49·2
Biscuit	0·26	0·322	0·307	263	258	38·8
Brick & Fireclay	0·23	0·772	0·720	71	173	19·4
Brushes & Brooms	0·25	0·153	0·140	58	253	33·8
Cardboard Box, etc.	0·22	0·425	0·405	95	261	34·9
Cattle, Dog Food, etc.	0·29	0·129	0·159	68	340	39·9
Cocoa, Chocolate, etc.	0·26	0·578	0·596	172	292	7·5
Constructional Engineering	0·25	0·636	0·691	162	232	14·4
Drugs, etc.	0·29	0·507	0·707	158	474	48·2
Electrical Engineering	0·27	2·776	2·545	290	188	31·6
Fertilisers, etc.	0·27	0·164	0·214	89	375	26·8
Furniture & Upholstery	0·21	0·832	0·773	63	176	24·9
Hair, Fibre, etc.	0·21	0·053	0·070	57	458	28·4
Hardware, Hollow-ware, etc.	0·27	1·878	1·742	90	208	17·7
Manufactured Stationery, etc.	0·28	0·455	0·521	110	349	22·7
Mechanical Handling Equipment	0·29	0·313	0·323	180	232	22·9
Miscellaneous Preserved Food	0·22	0·281	0·396	95	478	34·5
Newspapers, etc.	0·27	0·905	1·418	156	421	15·8
Paint & Varnish	0·21	0·353	0·611	91	567	23·4
Paper & Board	0·23	0·710	0·864	240	335	39·1
Plastic Goods, etc.	0·27	0·370	0·297	73	165	23·2
Radio & Telecommunications	0·29	2·159	1·836	478	157	21·9
Railway Carriages	0·29	0·964	0·795	119	161	32·5
Sports Requisites	0·21	0·089	0·068	63	153	40·0
Tailoring, etc.	0·22	3·594	2·499	65	146	21·2
Wholesale Bottling	0·25	0·282	0·505	52	694	45·1
Wooden Containers, etc.	0·22	0·242	0·224	47	222	44·0
		21·381	20·770			

[1] Abbreviated forms of the full titles of trades used in the Census.
[2] Percentage of total employment in *all* Census trades.
[3] Percentage of total net output in *all* Census trades.

APPENDIX—*continued*

(1) Trade.	(2) Location coefficient.	(3) % of total employment.	(4) % of total net output.	(5) Average number employed per establishment.	(6) Net margin per head, £.	(7) Coefficient of variation.
Trades with Location Coefficients 0·3–0·4						
Carts, Perambulators, etc.	0·34	0·078	0·065	73	186	—
Cement	0·39 [1]	0·109	0·240	232	801	—
Chemicals, general	0·33	1·079	1·485	197	369	23·8
Electric Lighting, etc.	0·32	0·177	0·160	109	218	43·5
Glass, other than containers	0·35	0·408	0·418	140	235	29·7
Ice-cream	0·33	0·023	0·044	58	781	—
Iron Foundries	0·35	1·275	1·327	137	216	17·3
Leather Goods	0·34	0·162	0·122	46	170	25·4
Leather, Tanning, etc.	0·31	0·363	0·634	74	603	20·0
Machine Tools	0·37	0·821	0·848	124	220	14·3
Margarine	0·35	0·059	0·094	184	548	—
Motor Vehicles, etc., manufacturing	0·35	3·393	3·547	309	199	26·3
Oils & Grease	0·34	0·101	0·169	55	517	20·1
Polish	0·32	0·063	0·102	74	580	55·8
Printing & Bookbinding Machinery	0·35	0·161	0·171	144	234	15·4
Railway Locomotive Shops	0·34	0·944	0·731	223	162	41·4
Rayon, Nylon, etc.	0·34	0·843	0·892	220	291	21·9
Rope, Twine & Net	0·34	0·144	0·122	82	238	17·6
Rubber	0·33	0·935	1·057	267	291	26·4
Scientific Instruments, etc.	0·38	0·716	0·656	101	192	23·9
Shipbuilding, etc.	0·37	2·483	2·289	341	141	48·7
Shop & Office Fittings	0·31	0·152	0·167	73	242	40·7
Tobacco	0·36 [1]	0·481	0·906	435	727	—
Toys & Games	0·31	0·222	0·177	96	188	20·7
Umbrellas & Walking-sticks	0·30	0·028	0·021	50	156	22·1
Wallpaper	0·37	0·042	0·059	131	455	—
Wire & Wire Manufactures	0·37	0·375	0·429	126	296	11·7
		15·637	16·930			
Trades with Location Coefficients 0·4–0·5						
Asbestos	0·42	0·155	0·220	241	445	—
Brass Manufactures	0·45	0·553	0·569	84	252	29·5
Electric Wires & Cables	0·48	0·684	0·783	758	316	26·8
Explosives & Fireworks	0·40	0·267	0·220	508	129	—
Fellmongery	0·41	0·017	0·020	35	325	40·6
Flock & Rag	0·48	0·071	0·079	37	332	26·9
Fur	0·47	0·082	0·079	36	184	28·5
Glass Containers	0·43	0·257	0·234	342	175	—
Glove	0·44	0·110	0·086	51	214	32·3
Hats, Caps, etc.	0·40	0·179	0·134	62	155	—
Ink	0·47	0·039	0·067	67	547	—
Iron & Steel, melting & rolling	0·44	2·149	2·358	503	212	26·4
Misc. Stationers' Goods	0·45	0·113	0·119	94	311	16·8
Non-Ferrous Metals	0·40	1·120	1·386	220	303	26·6
Roofing Felts	0·42	0·017	0·037	73	788	—
Seed Crushing	0·45	0·105	0·119	223	255	—
Soap, Candles & Glycerine	0·41	0·224	0·291	130	389	14·1
Starch	0·43 [1]	0·027	0·028	134	231	—
Sugar & Glucose	0·42 [1]	0·194	0·273	354	399	—
		6·363	7·102			

[1] Location coefficients obtained by Sargant Florence (*op. cit.*).

APPENDIX—*continued*

(1) Trade.	(2) Location coefficient.	(3) % of total employment.	(4) % of total net output.	(5) Average number employed per establishment.	(6) Net margin per head, £.	(7) Coefficient of variation.
Trades with Location Coefficients 0·5–0·6						
Abrasives	0·50	0·071	0·108	178	456	—
Blast Furnaces	0·55	0·293	0·376	534	306	17·2
Boot & Shoe	0·50	1·197	1·070	119	219	16·6
Carpets	0·50	0·245	0·254	184	307	21·4
Chain, Nail, etc.	0·52	0·839	0·850	122	247	26·4
Cinemetograph Film, production	0·50	0·110	0·230	144	361	—
Dyes & Dyestuffs	0·59 [1]	0·185	0·352	443	602	—
Fish Curing	0·55	0·084	0·065	31	170	21·7
Flax Processing	0·51	0·017	0·007	140	nil	—
Manufactured Fuel	0·55	0·015	0·022	50	388	17·6
Marine Engineering	0·57	0·578	0·490	555	135	40·7
Musical Instruments	0·58	0·068	0·092	65	396	39·2
Narrow Fabrics	0·53	0·195	0·166	87	236	25·3
Textile Finishing	0·55	0·791	0·700	124	188	31·6
Toilet Preparations, etc.	0·59	0·102	0·179	114	664	—
Tool & Implement	0·52	0·309	0·285	86	205	36·8
Wrought Iron & Steel Tubes	0·51	0·406	0·442	295	251	—
		5·505	5·688			
Trades with Location Coefficients 0·6 +						
China & Earthenware	0·77	0·710	0·540	199	158	44·7
Cinemetograph Film, printing	0·77	0·025	0·037	102	372	—
Coke Ovens	0·60	0·198	0·277	209	397	20·4
Cotton Spinning & Doubling	0·74	1·657	1·318	211	192	—
Cotton Weaving	0·70	1·120	0·959	134	222	25·4
Cutlery	0·61	0·139	0·171	75	368	—
Hosiery, etc.	0·61	1·017	0·891	100	243	25·2
Jewellery & Plate	0·60	0·217	0·201	58	201	45·8
Jute	0·89	0·185	0·126	239	165	—
Lace	0·66	0·132	0·152	46	378	—
Linen & Soft Hemp	0·79	0·120	0·085	149	184	—
Linoleum, Leathercloth, etc.	0·64	0·131	0·170	434	371	—
Made-up Household Textiles	0·68	0·044	0·044	40	341	—
Needles, Pins, etc.	0·62	0·227	0·190	117	199	31·4
Steel Sheets	0·61	0·214	0·250	570	247	—
Textile Machinery	0·60	0·725	0·691	160	194	43·7
Textile Packing	0·78	0·027	0·023	40	197	—
Tinplate	0·88	0·178	0·202	403	262	—
Woollen & Worsted	0·70	1·969	2·284	126	365	26·2
		9·035	8·611			
Trades for which Location Coefficients Could not Be Calculated						
Batteries & Accumulators	—	0·171	0·178	270	272	—
Ice	—	0·007	0·011	42	538	—
Incandescent Mantles	—	0·010	0·007	102	201	—
Match	—	0·041	0·040	104	276	—
Mineral Oil Refining	—	0·083	0·142	486	543	—
Precious Metal Refining	—	0·051	0·072	150	400	—
Preserved Meat	—	0·031	0·042	264	427	—
Small Arms	—	0·064	0·054	283	115	—
Spirit Distilling	—	0·049	0·101	48	781	—
Spirit Rectifying & Compounding	—	0·015	0·060	102	1,730	—
Vinegar, etc.	—	0·023	0·038	68	576	—
Watch & Clock	—	0·096	0·083	104	163	—
Wholesale Slaughtering	—	0·011	0·016	2	431	—
		0·652	0·844			

[1] Location coefficients obtained by Sargant Florence (*op. cit.*).

KEYNES AND SUPPLY FUNCTIONS

SIR DENNIS ROBERTSON in the ECONOMIC JOURNAL for September 1955 (pp. 474–5), challenges my statement that Keynes dispensed with the "familiar" supply function, and he quotes Keynes himself as describing his function (Z or D') as "simply the age-old supply function." In my Note in the ECONOMIC JOURNAL for December 1954 (p. 837) I remarked that it "does not differ materially from the 'familiar' supply function in terms of price," because "the relation of the wage-level to the price-level is implicit in Keynes' use of wage-units."

His use of wage-units he explained in Chapter 4. That chapter ends with a passage (pp. 44–5) in which price is equated to the ratio of Z (proceeds) to O (output), and this equation is described as "the ordinary supply curve." Here, I think, Keynes wrote hastily. The ratio of proceeds to output is not a "function" with any causal significance; it is merely a formula for calculating an index number of prices. Whatever influence the price-level has on output is felt equally in numerator and denominator and cancels out.

Keynes disliked the use of an index number, on the ground of the vagueness of "the concept of the general price-level" (p. 39), and objected that an aggregate of outputs of heterogeneous commodities is not a numerical quantity (p. 45). He conceded that for a single homogeneous commodity his formula had a definite meaning. Still it does not express a supply function.

The "ordinary supply curve" for a single commodity would express output as a function of price (in wage-units). That is to say O would be a function of $\frac{Z}{O}$. A transformation would make O a function of Z, and, since O is a function of N, a further transformation would make Z a function of N.

The ordinary supply curve applies to the case of a homogeneous commodity, supplied by a single industry, or to a group of commodities and industries, so long as the demand for the commodities is not materially affected by variations in that portion of the demand which emanates from the income of the group itself. While that condition is fulfilled, equilibrium can be defined as the intersection of the supply curve with the demand curve. The equilibrium can be specified in terms either of output and price or of employment and proceeds.

But when the demand and supply extend to the entire community, demand and supply are no longer independent of one another. Demand induces supply, supply generates incomes and incomes are the source of demand.

Keynes' aggregate supply function and aggregate demand function are statical concepts, representing equilibrium conditions. To every value of Z in wage-units, there corresponds a value of N which will allow a normal margin of profit and will therefore be consistent with equilibrium. Equilibrium then requires that demand, D, = income, Z (or Y). Thus, given equilibrium conditions, the demand curve and the supply curve are *one and the same.*

When Sir Dennis Robertson asks, "How are we to represent the intersection of D and Z on a two-dimensional diagram?" (p. 475), he no doubt has in mind the passage on p. 35 of the *General Theory*: "The volume of employment is given by the point of intersection between the aggregate demand function and the aggregate supply function." The answer to his question is that, D and Z being one and the same, there can be no intersection, and accordingly, Mr. H. G. Johnson's mathematical appendix is full of concavity and convexity, but is quite empty of intersection.

This conclusion does not depend on Keynes' identification of income with expenditure: it holds no less when the equality of D and Y is merely an equilibrium condition.

Mr. de Jong, in his Rejoinder (ECONOMIC JOURNAL, December 1954, p. 841), questioned my assumption that Keynes identified investment and saving. Surely there has never been any doubt on the subject. Their identity is unequivocally stated in Chapter 6 (pp. 61–5), and the point is driven home in Chapter 7 (pp. 74–85). In his article on "Alternative Theories of the Rate of Interest" (ECONOMIC JOURNAL for June 1937, p. 249), Keynes wrote that they "are necessarily equal in the same way in which the aggregate purchases of anything on the market are equal to the aggregate sales." That the identity of saving and investment entails the identity of income and expenditure (consumption, *plus* investment) is explicitly shown on p. 63.

Nor was this a new view on Keynes' part. In the *Treatise on Money* he supposed a difference between saving and investment to be possible, but only in virtue of his special definition of income. He defined income to include only so much profit as is the normal remuneration of entrepreneurs. With actual profit included in conformity with ordinary usage, he made income and expenditure identical in amount (*Treatise*, pp. 123–5). It is curious that this principle, that expenditure is necessarily equal to income, is formally indistinguishable from Say's *loi des débouchés*, that "supply creates its own demand," which (pp. 25–6) "must mean that $f(N)$ and $\phi(N)$ [that is, D and Z] are equal for all values of N." "That is to say," he proceeds, "effective demand, instead of having a unique equilibrium value, is an infinite range of values all equally admissible; and the amount of employment is indeterminate except in so far as the marginal disutility of labour sets an upper limit."

Keynes' identification of saving with investment, and therefore of income with expenditure, likewise makes the amount of employment indeterminate, and, to determine it, he brings in the rate of interest. The function of the rate of interest is to determine the *flow of money*, in its twofold form of income and expenditure. Investment is relevant, because he maintains that only through investment can the flow of money be regulated (Chapter 15). But it is equally true of the classical theory that the flow of money is the determining factor. The classical theory presupposed a metallic standard, which would determine the flow of money in accordance with the quantity theory. The common ground of Keynes and the classical economists is that fluctuations of employment are a purely monetary phenomenon. Keynes' asser-

tion on p. 26, that Say's law " is equivalent to the proposition that there is no obstacle to full employment," is true only if the monetary obstacle be assumed absent. The monetary system may determine $\mathcal{Z}$ at such a level that the existing wage-level is inconsistent with full employment. Unemployment will then prevail unless and until either the monetary system allows $\mathcal{Z}$ to expand or the wage-level is reduced. I suppose that according to the classical view the proper remedy would be a reduction of wages, for an expansion of the flow of money could only be fortuitous, so long as a metallic standard was faithfully adhered to. A devaluation was as repugnant to the classical economists as a reduction of wages was to Keynes.

The classical economists, however, can hardly be supposed to have regarded a condition of under-employment as one of equilibrium, for they would hold not only that a fall of wages would be the proper remedy, but that, under pressure of competition, the fall would actually occur. But if the level of wages in money be supposed to resist reduction, and if the monetary system be supposed to prevent any expansion in the flow of money, there would be equilibrium in a state of continuing underemployment.

For Keynes, on the other hand, the identity of income and expenditure made any position a fixture unless investment expanded. Income being tied down by the multiplier to the limit allowed by the volume of investment, the flow of money could be increased only if the relation between the rate of interest and the marginal efficiency of capital were such as to cause an increase of investment.

Keynes, it is true, admitted the possibility of a difference between D, effective demand, and Y, actual income, since the former was the demand expected by entrepreneurs. The passage on p. 78 of the *General Theory* referred to by Sir Dennis Robertson is not actually the only one in which this difference is mentioned. It is recurred to on p. 299.

The entrepreneurs' expectations may differ from the actual demand, and presumably the production they undertake, and the prices at which they offer it, will correspond to their expectations. The discrepancy will take effect in an excess or deficiency of sales. But, in virtue of Keynes' definition of investment, a deficiency of sales is investment, and an excess of sales is disinvestment. So, even if the entrepreneurs make a miscalculation, there is no divergence between demand and output. The distinction between expected and actual demand is, therefore, not material to Keynes' analysis. And, when he comes to define his " employment function " as the inverse of the aggregate supply function defined in terms of the wage-unit (p. 280), he actually formulates it not as $N = F(\mathcal{Z})$ but as $N = F(D)$. At that stage $\mathcal{Z}$ and D have become interchangeable. It is of interest to observe that, in the early draft of the *General Theory* (that in which D' appears instead of $\mathcal{Z}$), Keynes introduced the employment function with the words, " we prefer to substitute for the well-known Supply Function an alternative which we call the *Employment Function*." He did not define it as the inverse of the Supply Function, and did not mention D' (or $\mathcal{Z}$).

London. R. G. HAWTREY

KEYNES AND SUPPLY FUNCTIONS

I (*Professor Hawtrey*)

I FIND myself in the unwonted position of defending against attack certain features of Keynes's central apparatus, confusing as I personally find it.

(i) At the bottom of p. 44 of the *General Theory* Keynes is *not* asserting a functional relation between price and the ratio of sales proceeds to output. The equation there set out is surely to be read as follows: "Price being defined as sales proceeds divided by output, the supply price of a given output can be regarded as depending partly on the amount of employment necessary to produce that output and partly on the price necessary to induce that amount of employment." I see no reason to object to this statement. But the first $=$ in the equation had perhaps better have been written $\equiv$.

(ii) From the premise that, in Keynes's equilibrium, the *values* of the functions D and Z are equal, Professor Hawtrey seems to leap straight to the conclusion that the functions themselves are identical. This is surely a surprising kind of leap, which, if generally taken, would reduce all supply and demand analysis to futility! Mr. Johnson assures me that the curves representing his functions are perfectly capable of meaningful intersection.

Nevertheless, as I have said in my note, I think Hawtrey's Leap is defensible in this connection *on one assumption*, namely that entrepreneurs believe Say's Law. Now Keynes, while prone to believe that all economists except himself believed Say's Law, seems normally to have believed that entrepreneurs did not believe it, so that expected sales proceeds ("effective demand") could differ from actual production costs (including associated profits), though a position in which they did so would not be one of equilibrium. But I have suggested that he suffered from schizophrenia about this, and sometimes wrote as though entrepreneurs *did* (mistakenly) believe Say's Law, in which case the difference between D and Z *would* vanish, and disequilibrium would have to be represented as due not to a difference between the value of D and the value of Z but to a difference between the value of D or Z and the value of Y (actual sales proceeds).[1] I am grateful to Professor Hawtrey for pointing out two additional instances of this schizophrenia, viz., the brief and incidental clause half-way down *General Theory*, p. 299, and the notation of Ch. 20, where the function substituted for "the ordinary supply curve" (p. 281, line 1) is most surprisingly labelled not Z_W or even D'_W but plain D_W.

[1] The early draft of the *General Theory*, and my comments thereon, which I supposed to be no longer extant (this JOURNAL, September 1955, p. 476), have now come to light. My memory turns out to have been at fault in one respect; it was not in the chapter under discussion but in a later chapter that, in a passage subsequently removed, Y was introduced and distinguished from D.

II (*Professor de Jong*)

Section 1

The numbers refer to Professor de Jong's numbered sub-sections.

1. There seems to be some misunderstanding about the use of the word " profits." Marshall, Keynes, Hansen and I are all using it to denote the *whole* of entrepreneurial income, whatever the activity in return for which it may be supposed to be being received. De Jong apparently excludes certain elements of entrepreneurial income from " profits " and includes them in " factor costs."

With my (the usual) terminology, it is clear that Hansen, on his pp. 28 and 30, *does* recognise the need to include " profits " in Z, though I cannot agree to describing the profits to be included as " normal profits." They are the profits necessarily associated with a given output on Keynes's assumption that the curve of short-period marginal cost is a rising one, and that output is being carried to the point at which marginal cost equals price. In the kind of short period in which Keynes is mainly interested, namely one in which demand is depressed and unemployment rife, such profits will be *smaller* than normal profits as defined by Marshall.

3. (i) De Jong kindly confirms that in line 4 " an increasing " is a slip for " a decreasing " (see Johnson's Appendix, Section 3).

(ii) I think his reluctance to attach importance to the exceptional cases very properly listed by Johnson is very reasonable, but I do not think he draws the right inference. The right inference is surely that, under ordinary conditions, with methods (i) (*a*) and (iii) (*a*), the Z curve is definitely convex, and with method (iii) (*b*) definitely concave, to the X axis.

(iii) Hansen's curve belongs to the category (iii) (*a*), and should therefore have been drawn as a (probably) convex curve, not as a 45° straight line. To justify the latter procedure the quantity measured along the Y axis would have had to be not Z as defined by Hansen, but, as de Jong says, Z divided by something. But the divisor would have had to be not, as he suggests, W, but the *average* value product of labour, which is a different thing.

The objection to any such procedure is the same as that to the various other diagrams employing the 45° line, namely that they are quite uninformative, the analysis of the " supply side " of the determination of " output as a whole " having taken place *outside* the diagram.

4. I have long been willing to accept an " income-behind-expenditure " as well as an " expenditure-behind-income " lag. Neither Metzler nor others seem to have noticed that this refinement was long ago made by Pigou (*Theory of Employment*, 1933, p. 197). The reason for my original neglect of it was that I was concentrating on the simplest possible case—that of a society of small producer-consumers buying directly from one another—and was concerned to show that even in such a society, where there is no room for the second lag, a sequence analysis is necessary in order to elucidate an inflationary or deflationary process. So I do not like dropping " my " lag

altogether, as de Jong does in his equations (1) and (2), in which the money sticks for a time in the hands of the *firm* and is " disposed of " as soon as it reaches the hands of the consumer.

5. Well, let such analyses be called neo-Keynesian if anybody likes! But, of course, both my " step-by-step " analysis and the Swedish " expectational " one were *pre*-Keynesian in the sense of being anterior to the *General Theory*.

6. My rejection of the notion of an upward-sloping supply curve of labour is confined to that element of the supply of labour which is alone relevant to unemployment as ordinarily conceived,—namely the number of individuals seeking work. I have no quarrel with what de Jong says about the *hours* of work, but it does not seem to me to be directly relevant to the discussion of Keynes's definition.

Professor Hansen kindly permits me to state that he now thinks that the first part of his re-formulation of Keynes's " second classical postulate " could better be re-worded as follows: " unemployment is due to the fact that unemployed workers refuse to accept employment at lower real wage rates than are currently being paid." This seems to me to be an acceptable account of the classical position, provided that by B being " due to " A is meant, not necessarily that A is the initiating cause of the occurrence of B, but simply that the removal of A would effect the removal of B.

Section 2

(i) Say's Law, in the sense in which it is untrue, was, I believe, though I have never looked into it, withdrawn by Say himself. It was quietly rejected by Marshall some seventy-five years ago in the simple sentence: " But though men have the power to purchase they may not choose to use it."

(ii) It is not possible to form a considered judgment on Professor Koopmans's system on the basis of the brief summary given by de Jong. But on the face of it, if C is money received by the sale of consumption goods and I money received by the sale of investment goods in any period, then surely it is not " spendings out of income " (whatever that may mean in a totally unlagged system) but *total* spendings on final output in that period, whatever their source, which are equal to $C + I$, *i.e.*, to income received in that period.

D. H. ROBERTSON

Trinity College,
Cambridge.

KEYNES AND SUPPLY FUNCTIONS: THIRD REJOINDER AND FINAL OBSERVATIONS

I. Rejoinder to Professor Robertson

Section 1

1. Apparently, Robertson and I have been arguing at cross-purposes. Let me therefore try to reformulate my point against Hansen by making use, where possible, of the formulations suggested by Robertson.

Hansen explicitly subsumes "normal profits" under "costs." As Robertson has pointed out, Marshall, Keynes and Hansen (and Sir Dennis himself) all use the concept of "profits" to denote the *whole* of entrepreneurial income, whatever the activity may be in return for which it is supposed to be received. In my terminology, however, managers' salaries, managers' rents and managers' interests are excluded from "profits." These elements are included in "factor costs," and are therefore automatically included in Z; while genuine "profits" are taken as a residual income (as was done, for instance, in 1921 by F. H. Knight in his *Risk, Uncertainty and Profit*). My point is that even profits in this genuine sense should be included in Z. In the Marshallian terminology it is indeed clear—as Robertson states—that Hansen *does* recognise to include "profits" in Z, but Hansen is mistaken in describing the profits so included as "normal." Marshall writes on pp. 618–19 of the eighth edition of his *Principles*: "Thus the whole of *normal* profits enter into true or long-period supply price" (italics added). Under pure competition and a stationary state, Marshallian "*normal* profits" can therefore represent *only* the sum total of managers' salaries, managers' rents and managers' interests, *i.e.*, the entrepreneurs' personal opportunity costs, since under these circumstances "genuine profits" in the long run must be zero. The Keynesian concept of Z, however, includes these "normal profits" PLUS genuine profits (plus non-extrepreneurial factor cost). Under pure competition and a stationary state, genuine profits are zero. In the kind of short period in which Keynes was mainly interested, namely one in which demand is depressed and unemployment rife, genuine profits will be *negative* (that is, firms will make losses, in the proper sense of this word); this means, as Robertson points out, that "profits" in the broader sense (*i.e.*, the whole of entrepreneurial income) will be smaller than normal profits as defined by Marshall.

3. I agree.

4. It should be obvious that my definitions of "disposable" and "earned income" (Y_H and Y_F) are not Robertson's; the analogy with Robertson's method is confined to defining the disposable income of any period as being equal to the income earned in the previous period. Robertson is not willing to accept my construction, since he believes that I drop

"his" lag altogether in my equations $Y_H \equiv C + S$ and $C + I \equiv Y_F$, in which, according to him, money sticks for a time in the hands of the *firms* and is disposed of as soon as it reaches the hands of the consumers. Personally, I do *not* think that I have dropped the Robertsonian lag (*i.e.*, the consumption lag); it is included in the income-propagation period together with the other two Metzlerian lags. In my construction it is perfectly possible for the money to stick for a time in the hands of the consumers. As this time grows longer, the entire income-propagation period, of course, grows equally longer if the income-expenditure period with the firms, *i.e.*, the sum total of the other two Metzlerian lags, remains constant. My construction is analogous to that of F. Machlup, according to which the disposable income (in Machlup's tables: "Past ΔY") is identically equal to the earned income (Machlup's "Current ΔY") of the previous income-propagation period (Machlup's "Period E").[1]

5. When I suggested to read "Post-Keynesian," I had in mind to define this concept as follows: Post-Keynesian economics is that type of modern economic theory which derives from a synthesis of classical (pre-Keynesian) and Keynesian economics. Incidentally, "pre-Keynesian economics" is a wider concept than "classical economics": it involves, of course, also "pre-Keynesianism" in the sense of "Keynesianism *avant la lettre*."

6. I agree. But in *some* cases it may *become* relevant to allow for the hours of work, namely, when the number of "desired hours" deviates from the actual number of hours a day during which labourers are employed.

Section 2

(i) I agree; see also *General Theory*, p. 19 n., and Hansen, *A Guide to Keynes*, p. 13, who both quote the same passage from Marshall. It is well known that the older underconsumptionists (for instance, Marx) also rejected Say's Law. My point was only that Koopmans made a relatively early "impressive" attack upon Say's Law, to use Hansen's expression. Koopmans was the first to give an elaborate and consistent *theory* based on the refutation of Say's Law.

(ii) Robertson is right in reading "*total* spendings on final output" for my faulty expression: "spendings out of income." I also agree that, owing to pressure of space, my summary of Koopmans' theory was too brief to supply an opportunity for a mature judgment of Koopmans' theory of

[1] F. Machlup: "Period Analysis and Multiplier Theory," *Quarterly Journal of Economics*, LIV (1939), pp. 1–27, reprinted in the volume *Readings in Business Cycle Theory*, Philadelphia and Toronto, 1944, pp. 203–34, esp. pp. 210–15; see also his: *International Trade and the National Income Multiplier*, Philadelphia, 1943. On p. 211 of the reprint of his 1939 article, Machlup writes: "The time interval between the first and the second increase in income [that is, the income-propagation period] was determined by the number of persons through whose hands the money had to pass, and by their particular transaction periods *C* [that is, their income-expenditure periods], in addition to the income period *C* of our road workers [that is, *of the households*]." (Words in square brackets are added). Machlup shows here the point of dividing time into periods even if the component parts of the "lag" (*i.e.*, the income-propagation period) are distributed among different economic units.

monetary equilibrium. Since I feel that it is a pity that this theory is not known by most English-speaking economists, I shall elsewhere give a more comprehensive exposition of it.[1]

II. Final Observations

Now that the long discussion of my article on "Supply Functions in Keynesian Economics" [2] is to be concluded, it may be of some use to strike its balance, that is, to supply a summary of the discussion in so far as it has not drifted away from my central theme. I will do so by answering the following question: "If I were now to rewrite my article, which passages would I then formulate differently from the way I did in 1954?"

There are five such passages. In order to keep this summary as brief as possible, I shall follow the admittedly less-elegant method of referring, where possible, to passages which have already been published elsewhere in this Journal. Italicised page numbers refer to my original article.

(i) *P. 9, Fig. 5.* Both curves, D and Z, should be drawn *convex* to the N-axis.

(ii) *P. 9, last line; I should now like to add a footnote to "Fig. 5":* In Dillard's diagram, the D-curve is drawn concave to the N-axis and the Z-curve is approximately linear. Professors D. H. Robertson and H. G. Johnson have pointed out that Dillard's curves do not represent very probable cases. (See the issue for September 1955 of this Journal on pp. 475 and 477–8.)

(iii) *P. 17, line 2 from the bottom; I would now insert a footnote to "p. 28."* To begin with, I would now say what I have already stated above in Section I (Rejoinder to Professor Robertson) under number 1, about the problem of "profits." Then, I would quote what Robertson has said about Hansen's diagram in Section II, number 3 (iii) of his Comment, published in the present issue.

(iv) *On p. 19, the two paragraphs below Proposition X, down to "There can be equilibrium only . . .", should read as follows:*

The intercept between the 45°-line and the curve of aggregate factor costs, $F_r(Y_r)$, in Fig. 7, indicates the profits $P^{\max.}{}_r(Y_r)$ which, if they *were* expected, would suffice to elicit that volume of output.[3] The latter function shows the volume of Y_r—and thereby the volume of employment—which entrepreneurs will supply at any value of $P^{\max.}{}_r$.

The function $D_r(Y_r)$ shows consumption expenditures *plus* investment

[1] See my forthcoming paper on "The Concept of Monetary Equilibrium, and Its Relation to Post-Keynesian Economics," which will probably appear in the issue for September 1956 of the *Weltwirtschaftliches Archiv* (in English). A summary of a recent discussion of the topic in the Netherlands, also from a statistical angle, is given in my article "Méthodes statistiques d'analyse de la situation monétaire" in the issues for March and April 1956 of the *Bulletin d'Information et de Documentation*, published by the National Bank of Belgium (in French; also published in Dutch).

[2] Pp. 3–24 of the issue for March 1954 of this Journal.

[3] I am indebted to Professor Robertson for this formulation. See the September 1955 issue of this Journal, p. 475.

expenditures expected at any value of Y_r, *i.e.*, the proceeds which entrepreneurs actually expect to make at any value of Y_r. The intercept between the D_r-curve and the F_r-curve shows therefore the profits P_r which entrepreneurs will actually expect to make at any value of Y_r. There can be equilibrium only . . . (etc.)

(v) *Insertion on p. 20, between lines 7 and 8 from top :* [1]

Let me make two remarks at this point. First, as has correctly been concluded by Soper,[2] in this process of transformation, the supply aspects of the curve are lost. Soper points out that there is not one but many aggregate supply curves ($\mathcal{Z}N$), each corresponding to a different series of price sets, and they all transform to the same 45°-line. My point is exactly that, for a proper understanding of the *economic* meaning of the 45°-line, it is necessary to consider the model of Fig. 5 together with it.

Secondly, Robertson has directed my attention to the fact that Keynes, on pp. 25 and 29 of the *General Theory*, defines D as *expected* proceeds, whereas on p. 30, he defines it as what entrepreneurs *can* expect, *i.e.*, presumably what they ought to expect because this is what in fact will happen; or, we might as well say that Keynes defines D on his p. 30 as "actual proceeds." (I would then quote the essence of what Robertson has written on p. 476, third paragraph, of the September 1955 issue; and after that, p. 480, line 12 from the bottom of the main text down to the end of Section 4 on p. 482 of my Second Rejoinder in the same issue; I would also insert a footnote containing Section 4 of the Third Rejoinder, published in the present issue. After all this, I would proceed as follows:)

It is now possible to add a caution on the issue of the equilibrium conditions included in the simplified models of Figs. 1 and 5.

In the case of Fig. 1, the equilibrium condition reads:

$$S_r = Y_r \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1.4)$$

However, it is certain that Keynes himself treated the equality of saving and investment as an identity:[3]

$$S_r \equiv I_r$$

Are not these two views incompatible?

The crucial point is that Keynes chose to define the concepts of saving and investment entirely *ex post*; that this is so (although Keynes did not use the terms "*ex ante*" and "*ex post*" in his *General Theory*) appears from his argument on pp. 75–6, where he rejects Professor Hawtrey's suggestion that "investment" should be defined to exclude undesigned increments in the stock of unsold goods. Neither did Keynes define "saving" to exclude undesigned saving. It is because Keynes deliberately included undesigned components in his definitions that, in his argument, the relation between saving and investment must be written $S_r \equiv I_r$.

[1] If I were to rewrite the article, I would give this insertion in small print.

[2] C. S. Soper: "The Supply Curve in Keynesian Economics," *South African Journal of Economics*, XXIV (1956), pp. 1–8, esp. p. 8.

[3] *General Theory*, pp. 61–5 and 74–85.

The difficulty is here that no conclusive equilibrium theory can be built up by means of such an *ex post* identity. To obtain a conclusive theory, all magnitudes in the behaviour equations must be defined *ex ante*, that is, as purely " designed " magnitudes.[1] In my equation (1.4), S_r and I_r are taken as *ex ante* magnitudes. This equation is apparently not a " Keynesian " but a " Post-Keynesian " equation.

I feel, however, that it is possible to detect the equilibrium condition of *ex ante* $S_r = I_r$ also in Keynes' own work, be it only in an *indirect* or *implicit* formulation. In the model of Fig. 5, the equilibrium condition reads:

$$D = Z^{2} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5.3)$$

In this equation, Z, *i.e.*, macro-economic aggregate supply price or income actually received, denotes the sum total of micro-economic aggregate factor cost plus the sum total of micro-economic (genuine) profits. Therefore, Z is exactly the same concept as " disposable income " (Y_H) as defined in this paper. Further, D, which stands for proceeds, whether expected or actual during the current period (or effective demand, or expected income) coincides with the concept of " earned income " (Y_F) as defined in this paper. It is therefore legitimate to reformulate Keynes' equilibrium condition (5.3) as:

$$Y_F = Y_H \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5.3\ bis)$$

Subtracting: $C \equiv C$

we obtain: $I = S \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (\sim(1.4))$

where I and S are taken *ex ante*.[3]

It appears that the equilibrium condition (1.4), which was explicitly rejected by Keynes, is none the less implicit in his own exposition.

F. J. De Jong

The State University of Groningen,
The Netherlands.

[1] Much confusion exists about the problem of how to define the concepts of " *ex ante* " and " *ex post* " in a consistent way. I will try to formulate such definitions in my forthcoming paper in the *Weltwirtschaftliches Archiv*.

[2] *General Theory*, p. 25. It is evident that Keynes treats this equation as an equilibrium condition and that any components included in D and Z must therefore be *ex ante* magnitudes.

[3] Only of *ex post* values of income Z (so that *ex post* $Z \equiv D$) it can be said that the *curves* D and Z will entirely coincide even when entrepreneurs do not believe in Say's Law. I feel that this is the solution of the difficulty raised by Hawtrey in his Comment, published in the present issue of this Journal, where he writes: " Thus, given equilibrium conditions, the demand curve and the supply curve are *one and the same*." But Keynes thought in terms of *ex ante* Z, and then these curves represent behaviour equations which do *not* coincide. I agree with Robertson in his Rejoinder to Hawtrey that Hawtrey's " leap " is a surprising kind of leap.

THE GROWTH OF BRITISH INDUSTRY[1]

THE recent interest in long-term economic growth and in the process of industrialisation at all its stages has put a premium on the quantitative records of economic history. Many of these records are grossly inadequate to the purposes for which we should like to use them, but they exist in considerable volume, and their exploitation has been long overdue. Professor Hoffmann's attempts to measure the secular trends in Britain's total industrial output over a period of two and a half centuries are an important and substantial contribution to a neglected field of research.

Professor Hoffmann's work in this field is already well known of course. The original edition of his book was published in German more than fifteen years ago.[2] It has been commonly quoted and used by English-speaking economists for at least ten years. But the barrier of language is surprisingly powerful. Many of those who have been exposed to the original text have never had the temerity to use the final results, and those who have made use of the famous index have often criticised it without attempting to improve upon it.

It must be admitted also that the composition and basis of the index are far from clearly defined, even when there are no problems of language to be overcome. The author expects his readers to take a great deal on trust. We are given the final indices, all converted to a 1913 base, with none of the original quantity series and with none of the basic estimates of value from which the various systems of weights are derived. We are told what proportion of the total industrial output of the United Kingdom is thought to be reflected in the index, but we never learn what has been left out, or how in practical or in theoretical terms the author defines total industrial output. Those who use Professor Hoffmann's results must wear blinkers unless they are prepared to go back to the original sources in full detail. They may be forgiven if they take refuge in a vague scepticism.

This is an unfortunate state of affairs, for Professor Hoffmann has produced an index (or rather a set of indices) which is unique in its temporal and industrial coverage. He has done more than any of his predecessors in this field to compile and analyse the records of British industrial growth. If his data are not always strong enough to support his conclusions, it is important to know the areas of their weakness and their strength. It may be a long time before the Hoffmann index is replaced throughout its length and breadth by a better one. The need for a thorough assessment of its reliability will be felt by all who are interested in the character and causes of British economic growth.

[1] A Review of *British Industry 1700–1950*, by Walther G. Hoffmann. Translated by W. O. Henderson and W. H. Chaloner. (Oxford: Basil Blackwell, 1955. Pp. xxiii + 338. Price 35*s*.)

[2] *Wachtsum und Wachstumsformen der Englishen Industriewirtschaft von 1700 bis zur Gegenwart*. (Jena, 1940.)

It is the object of this note to attempt to evaluate the Hoffmann index in terms of its underlying data. Unfortunately it cannot claim to be more than a first attempt at such an evaluation. Partly because Professor Hoffmann has been so tantalisingly obscure about the intermediate stages of his estimates, but largely because he has covered such a wide area that only those who have attempted the same gargantuan task can be familiar with all his original series, it is likely that more than one review of his work will be required before we have sufficiently definite and complete assessment.

Methods of Measurement and their Results

The Hoffmann index of total industrial production is a weighted average of output indices calculated for different branches of industry. There are seven weighting periods, for each of which the author has calculated the net output of all industry and the net outputs of those industries for which he could find indicators of the year-to-year change in physical output. The value estimates are not given, but it would appear that for the first four weighting periods (*i.e.*, up to 1860) they were derived mainly if not entirely from contemporary estimates of gross output.[1] The conversion from gross to net was made " on the basis of a number of calculations concerning industrial output in various countries at various times—particularly the early statistics of output in the United States as well as isolated figures from British sources." For the three weighting periods which covered the last ninety years of the index, the estimates of net output seem to have been made by applying estimates of average earnings to Census of Population occupational data and (in the twentieth century) on the basis of Censuses of Production.

The component indices for different industries are based on actual production statistics wherever possible and on " representative " or " substitute " statistics where there are no direct indicators of output. Actually until the second half of the nineteenth century few of the production series are direct indicators, for they either cover the output of limited geographical areas only or are unlikely for other reasons to be comprehensive. Few of the excise series, for example, were complete in all respects for the whole of the United Kingdom, even if we discount the possibility of evasion varying with the level of tax. However, " representative " or " substitute " indices were often reasonably satisfactory indicators of long-term trends. Raw cotton imports are probably as good a reflection of the growth in the manufacture of cotton yarn and cloth, for example, as one could hope to obtain when direct data are non-existent.

[1] P. 17. A footnote on this page states that " Statistics of the value of gross output of certain industries are available for the years 1783, 1812 and 1850." For 1783 the source is presumably the estimate quoted (but very sceptically) by D. Macpherson on p. 15 of Volume IV of his *Annals of Commerce*; for 1812 it is probably Patrick Colquhoun's table of new property created annually in his *Treatise on the Wealth, etc., of the British Empire* (although these are estimates of net output rather than of gross output); and for 1850 it is possibly Braithwaite Poole's *Statistics of British Commerce*, which claimed to estimate the " total weight and value of everything moveable except Passengers . . . on the railways." For the 1740 estimates of net output the only clue we are given is that they are based on " other contemporary evidence."

In combining his indices Professor Hoffmann has distinguished consumer-goods industries and producer-goods industries. He has calculated an index of total industrial production inclusive of building as well as exclusive of building. Finally, he has compiled a number of non-industrial indices which are designed to sketch in part of the general background against which his production indices should be set: these include indices of railway traffic, shipping clearances, letter post, patents, bankruptcies, quotations of stocks and shares, and population.

To these various indices Professor Hoffmann has applied various measures of growth and trend. His preferred measure of growth is a " mean coefficient of expansion " which is an arithmetic mean of annual percentages of expansion of output calculated by the method of Least Squares.[1] He distinguishes this from a " mean rate of growth " which is a geometric mean of year-to-year output relatives. He has further analysed his data by means of a double ten-year moving geometric average designed to show changes in the average growth of output taken over a fairly long period of time.[2]

The mean coefficient of expansion derived from Professor Hoffmann's total industrial output index works out at 0·9 for the period 1700–80, 2·8 for 1781–1913, 2·6 for 1819–1913, 2·0 for 1855–1913 and 0·9 for 1923–35. Actually he inclined to the view that the industries forming the basis of his index for the period 1700–80 expanded faster than the national average and that the coefficient for this period " might reasonably be estimated at 0·7 or 0·8 rather than at 0·9." [3] He deduced from his data that the main turning point in the industrialisation of the United Kingdom occurred about the year 1780, and that it initiated a period of very rapid industrialisation which was temporarily checked by the Revolutionary and Napoleonic wars, but which was resumed after about 1817 and continued until about 1855. After that the rate of industrial growth began to decline. In terms of the annual percentage rate of growth, Britain's industrial output (including building) increased by less than 2% in the eighteenth century and after 1876; by between 3 and 4% in 1780–92 and again in 1818–55; and between 2 and 3% during the Revolutionary and Napoleonic wars and in the period of transition which he has ascribed to 1856–76.

By further analysis, variations in the patterns of growth as between industries have been illuminated, and the author has made his own attempt to explain them. The " typical " pattern of evolution of British industry has involved three stages—a stage characterised by a rising rate of growth of output, a stage where absolute output is still rising but the rate of growth is declining, and a stage where there is an absolute decline of output. Most British industries, according to Professor Hoffmann, " have now reached the phase of retarded expansion in the growth of their rates of output." [4]

[1] The equation is $\log b = \frac{\Sigma x \log y}{\Sigma x^2}$, where b is the mean coefficient of expansion. Pp. 65–7.

[2] This gives him his " annual percentage rate of growth " or " mean rate of growth." Pp. 117–20.

[3] P. 34. [4] P. 191.

Eighteen of the forty-five industries examined by him appear to have reached the stage of absolutely declining output. In discussing the reasons for the decline in British industries Professor Hoffmann has laid most stress on the growth of competition in home and overseas markets. He has pointed to the Free Trade policy of the mid-nineteenth century as the significant factor in checking the current rate of expansion of important British industries.

Finally, Professor Hoffmann has drawn attention to the existence of a long wave in Britain's industrial output. In most cases the long wave has been found to last twenty years. "These fluctuations are obviously different from the approximately ten-year trade cycle which economists have often described in the past." [1] On the basis of a comparison of his pre-1800 data and post-1800 data he had concluded that the average duration of the long wave tended to increase as Britain became more industrialised. By a comparison of various pairs of industries which satisfy joint or similar demands or are associated in some ways during the process of production, he has produced some suggestive conclusions concerning the correspondence between their long waves.

This very brief account of Professor Hoffmann's methods, results and conclusions does not attempt to do justice to the wealth of statistical material and analysis which is crammed into the covers of this one volume. It is hoped, however, that by summarising the process and uses to which the author has submitted his material it has set the stage for a discussion of the basic strength of the index in the light of the burdens which have been placed on it.

The Basis of the Indices

It is obvious that the reliability of the index and of its various component indices will vary with the quality of the underlying series and their coverage in relation to the industry or industries whose trends they are designed to reflect. Since quality and coverage both vary through time, it is convenient to consider the composition of the Hoffmann index at its different weighting periods.

The weights at each period and the relative weight of the selected industries as a whole are set out in full.[2] Not all the indicators for the selected industries were available for the whole of the weighting period in which they were absorbed into the index, and the table of weights does not give a complete picture of the coverage of the index at particular points of time. This is particularly true for the eighteenth century, when the number and importance of the new series absorbed in the course of each weighting were both high. For the period 1700–60 the selected industries are given a weight of 47% of total British industrial output. But the main constituent of this 47% is the woollen industry with a weight of 32%, which does not

[1] P. 134.

[2] Pp. 18–19. It would have been very much easier to assess the value of Professor Hoffmann's index if he had given us the net output estimates which form the basis of his calculation of total industrial output and of the industrial output of the selected industries at each weighting period.

enter into the index until 1739. So for the first four decades of the century the index covers only 15% of his estimated value, and of this more than 60% is attributable to coal shipments into the port of London and malt charged to excise in England and Wales. It is seriously open to question whether the trend in coal shipments into London was a good reflection of the trend in total output of coal, and even more open to question whether this coal can be regarded as primarily a producer good. The malt series is obviously not a simple one. Although it moves in broad sympathy with the excise series for the output of strong beer during the first half of the century, it behaves very independently at the end. By the last decade of the century, for example, when the average annual output of strong beer charged to excise was running at a level which was nearly 50% above that of the first decade, the corresponding increase for malt was under 10%.[1]

The series underlying the index for the woollen and worsted industry, which appears in the index in 1739, is a series for woollen cloth produced in the West Riding of Yorkshire. According to contemporary estimates Yorkshire accounted for about 42% of the total value of the industry's output in 1774,[2] and although it would be unwise to assume that the industry grew at the same rate in other parts of the country, the series probably reflects the trend for an important proportion of the total output. However, when this series first became available it was available in terms of pieces rather than of yards, and, since the yardage per piece varied substantially, the record of pieces is no reflection of the trend in output.[3] It was presumably for this reason that from 1769 onwards the record began to be given in yards, and the corresponding record of pieces shows that the variation in length continued. Hence for the first seven decades of the eighteenth century the index is almost entirely based on London consumption of coal, a malt series that requires a good deal of explanation and a series for woollen textiles which is certainly a distorted reflection of the output it directly records.

The second weighting period runs from 1761–1800, but most of the new series absorbed during this period were not included until after 1780. The cotton industry was given an increased weight, and from 1760 onwards the series for the imports of raw cotton accounted for a growing proportion of the movement in the index. But the re-weighting reflected a growth in several industries not included in the index (or not included until after 1785), and it happens that around the year 1780, which Professor Hoffmann has identified as a turning point in the rate of British industrial growth, the coverage of the selected industries was only 43% according to his

[1] The excise series for malt and for beer (which is not included in the Hoffmann index until the end of the century) are given by T. S. Ashton in *An Economic History of England: The 18th Century*, 1955, pp. 241–2. Professor Ashton also reprints a number of other series for the eighteenth century, some of which have been used by Professor Hoffmann and some of which have not.

[2] Estimates of the Committee of 1774 quoted by Herbert Heaton, *The Yorkshire Woollen and Worsted Industries*, p. 280.

[3] According to a contemporary, the average length of a piece of broadcloth doubled between 1727 and 1757. Joseph Massie, *Ways and Means of Raising the Extraordinary Supplies, etc.*, 1757.

estimates, nearly two-thirds of which was attributable to London's receipts of coal and the West Riding woollens, and a further 15% to imports of raw cotton. It is difficult to see how this flimsy evidence could be so convincing as to establish that " the change in the rate of production which occurred about 1780 was so definite that it clearly marks an epoch in the evolution of Britain's economy," [1] or to justify conclusions concerning a lengthening of the long wave for British industry.[2]

This is not to deny that in the last two or three decades of the eighteenth century the crucial turning point did occur. Almost certainly it did. But Professor Hoffmann's claim to have dated the turn—more or less precisely—is not substantiated by his evidence: nor is his claim to have measured the extent of the change in the rate of output at this point. It is possible—even probable—that the rate of growth in the decades before 1780 was higher than the data on London coal consumption and West Riding woollens would suggest. Equally it is probable that the series which were absorbed into the index after 1785 had entered on their stage of rapid expansion several decades earlier.

In sum the index for the eighteenth century is of very doubtful value. It seems likely that the import and export statistics have a better claim to be regarded as an index of the long-term trend in the volume of industrial production than a combination of this limited selection of doubtfully representative production series.

At the turn of the century, however, the index is in a much more healthy state. The weights for the weighting period 1801–30 have the benefit of some well-considered output estimates made by Eden and Colquhoun.[3] The number of series included is considerably expanded both by the addition of new excise series and by a variety of commodity import and export data. For this period and the succeeding one the author has estimated that his selected industries cover more than three-quarters of the total industrial output of the United Kingdom including building. It is a question whether they can be held to cover as much as this of the industrial output of Ireland (which then accounted for about a third of the population of the United Kingdom), but as Britain's industrialisation gathered momentum the importance of Ireland's share in industrial output declined. It is also doubtful whether the distinction between producer goods and consumer goods is very rewarding at this stage. The series for producer goods are very indirect or very incomplete, and it is not until around the middle of the next weighting period (1831–60) that they become strong enough to stand alone. For manufactured consumers' goods, on the other hand, there is a fairly wide selection of series by the beginning of the century.

In effect, therefore, for the early years of the nineteenth century the Hoffman index summarises a great deal of valuable evidence, is unique of its

[1] P. 32. [2] P. 134.

[3] A calculation by Sir Frederick Eden of the output of most British industries for about 1800 is quoted by Macpherson, *op. cit.*, Volume IV. Colquhoun's estimates, *op. cit.*, are based on a considerable range of contemporary estimates, and are given in elaborate and rewarding detail.

kind [1] and merits serious consideration as a reflection of the broad trends in Britain's industrial output at that period.

The strength of the underlying estimates and of the individual series certainly increases as we move on through the nineteenth century. There are many more direct and relatively reliable production series. The Census of Population occupational returns and the growing wealth of wage data provide additional buttresses to the output estimates and, beginning in 1907, we have the first of the Censuses of Production.

It is interesting to note, however, that in terms of its industrial coverage the index seems to have reached its peak in the 1861–90 weighting period, when it was estimated to account for over 80% of total industrial production including building. From then on, presumably as new industries increased in number or size, the coverage of the index declined, so that in the first thirty years or so of the twentieth century it was estimated to account for about 72 or 73% of total industrial production, which was rather less than had been claimed for it during the early decades of the nineteenth century. Now it may be that when the Censuses of Production were available the author was in a better position to estimate the size of the universe within which his selected industries lay, and that in earlier periods he had overestimated the coverage of the index. It is, however, a plausible assumption that the expanding economy of the late nineteenth and early twentieth centuries was responsible for an increase in the number and size of industries which lay outside the index. If we assume, however, that the excluded industries were largely new industries and that the effective index was therefore heavily weighted with old industries the probability is that Professor Hoffmann has underestimated the rate of growth in his last two weighting periods—that is between 1891 and 1935.[2]

In sum therefore I would argue that for the eighteenth century Professor Hoffmann's index is too inadequately based to throw much light on the history of British industrial growth at this crucial period and that it adds nothing to the evidence already available in published trade and excise statistics. For the nineteenth century and (probably to a lesser extent) for the twentieth century, on the other hand, it is a highly significant contribution to the basic material for an analysis of economic growth. It will

[1] Lord Beveridge published an index of industrial activity in two articles published in *Oxford Economic Papers*, 1940. They were "The Trade Cycle in Britain before 1850" and "The Trade Cycle in Britain before 1850: A Postscript." The index is based partly but not entirely on the series which Professor Hoffmann used, and it would be interesting to compare the two indices. Unfortunately Lord Beveridge, like most trade-cycle enthusiasts, has deliberately and effectively eliminated the trend.

[2] Cf. the criticism made by Professor W. Arthur Lewis in the Statistical Appendix to his article on "World Production Prices and Trade, 1870–1960," *Manchester School*, Volume XX, 1952, No. 2, p. 135. Professor Lewis writes of the Hoffmann index that: "The downward bias of this index is such that when comparison is made with the Censuses of Production of 1907 and 1924 Hoffmann's index is seen to underestimate the increase of postwar production by at least 20 per cent." It should be noted that Professor Hoffmann, on being informed of this criticism, did not feel that the available statistics were sufficient to justify a revision of the index (footnote p. 208).

be appreciated, however, that there is a considerable subjective element in this assessment. Others may find that Professor Hoffmann's small selection of eighteenth-century series provides a more convincing reflection of industrial trends at that period than has been suggested here. Certainly those who are familiar with the details of his nineteenth-century series, and with the economic history of industries which have been omitted from the twentieth-century index, will have a great deal more than the present reviewer to say about the composition and quality of the index in more recent periods. The value of Professor Hoffmann's researches in this field, however, is such that his results would well repay further scrutiny and analysis.

PHYLLIS DEANE

Department of Applied Economics,
University of Cambridge.

REVIEWS

An Economic History of England. The Eighteenth Century. By T. S. Ashton. (London: Methuen, 1955. Pp. 257. 18*s*.)

In the fifty years since Mantoux published his classic account of the "Industrial Revolution in the Eighteenth Century" a steady flow of monographs and articles has changed many of the older views and made a new work on that century imperative. That Professor Ashton should now have undertaken this task is particularly fortunate, for his own contributions to the study of this period have been so massive. And he has again in this book broken new ground in many places. The fresh evidence of the output of certain commodities and the tables of exchange rates which he so modestly relegates to an appendix constitute a major step towards the building of a quantitative framework for the study of eighteenth-century trade and industry. The result is a work which will remain a standard reference for years to come. It exhibits once more those qualities that lend such distinction to Professor Ashton's work, the discrimination and integrity in the handling of evidence, the taut but readable economy of words, and the apt illustrations and distilled reflections that only a life-time of study can command.

The book opens with an introductory survey of the people of England, their occupations and their wealth, their habits of economic calculation as well as their love of gambling. By laying alongside one another two parallel sketches, one which emphasises elements of mobility, both geographical and vertical, in the population, and the other which shows the cheapness and increasing mobility of capital, Professor Ashton neatly sets out many of the pre-requisites of economic advance.

How that advance was achieved, in all its local variety, is the central theme of the chapters on agriculture, industry, transport, finance and labour. These essays are too rich for summary and comment. All that a reviewer can do is to mention some of the major features. For agriculture there is an up-to-date account in which the increasing size of farms and the specialisation of crops are given full weight in addition to enclosure and improvement, which so often are solely invoked to explain increasing output. A major new contribution is the description of those industries, and they were many, which were largely dependent upon agriculture for their raw materials, whose prosperity or depression waited upon the harvest or upon the health of livestock. In the discussion of industrial change, better management, the use of local coal, timber or water supplies, all receive attention, but at the centre of the process called the industrial revolution lies "the speeding up of production and distribution by the new machines and new means of transport, [which] made it possible to transmute circulating into fixed capital" (p. 112). The chapter on labour, which should be read in conjunction with

that on industry, reveals the insecurity of life and irregularity of work under those industrial arrangements whose variety and whose impersonal nature lies concealed under the headings of outwork or domestic "systems." Professor Ashton shows how, gradually, with more regular supplies of raw material, and with better organisation, a section of the labour force came to be employed more continuously and more efficiently. Over living standards he is cautious, but gives a general impression of upward movement in "the progressive state." In all these chapters the aim is to supplement existing accounts, and emphasis is placed upon continuity of development; for the story of technological advance students can easily go elsewhere. Even here, however, Professor Ashton has firmly revised the chronology of industrial change; it was in the late 1780s rather than in the 1760s that there occurred the sharp upward movement of industrial output which we think of as revolutionary.

Professor Ashton's mastery is time and again revealed, and it is at the risk of appearing arbitrary that the following comments are offered upon the core of the book. On the recently re-opened problem of the rise in English population Professor Ashton has some excellent pages. His suggestion that the growth of numbers in the first half of the century was limited by disease and harvest failure is important. Equally his discussion of the limitation on the total number of marriages due to the disproportion in the balance of the sexes within the narrow areas from which people took their marriage partners should be set alongside Professor Habakkuk's emphasis on the age of marriage in limiting births in a pre-industrial society.

Secondly, one must register a note of caution about Professor Ashton's emphasis on short-run changes in interest rates, which in the present volume are closely linked with fluctuations in investment. He now regards interest rates as indicators of the ease of borrowing, of the willingness of lenders to lend, and tends to restrict the positive stimulus of low interest rates to the constructional industries—building, turnpikes and canals. There are difficulties in weighing the evidence in support of this view. First, the use of the Funds as indicators may reflect primarily credit conditions in London; there is still some way to go before we can be sure how far London and provincial lending and borrowing facilities were linked. Secondly, while speculative building seems to reflect changes in the cheapness and availability of credit, I should like to see more detailed proof of the concern of canal and turnpike builders about interest as an element in costs, compared with say materials or labour.

An outstanding virtue of Professor Ashton's writing is its candid preference for revealing to the student what we do not know, rather than papering over the cracks of historical research. Lack of records prevents us from reconstructing the lives and work of "those rural craftsmen who must have outnumbered the workers in several of the more highly organised industries" (p. 91). Elsewhere we are reminded of our ignorance of the history of building in a great age of construction, of shipbuilding in a maritime power, even of shopkeeping in the nation of shopkeepers. In this way

the book will act as a starting point for further research, because its candour and comprehensive sweep deepen our sense of the unevenness of recent investigations. The excellences of our industrial history are largely the product of the Manchester school; we are at present less well informed about some of the London industries, and of those in the South that either declined or stagnated. As their archives are explored the economic activities of landowners may need a greater or a different emphasis—what proportion of their income or how much borrowing was devoted to building the Georgian country houses, not to mention the architectural extravagances of the great? Nor will a firm judgment on the social conditions in the new industrial towns be possible until, as Professor Ashton notes (p. 18), we have more histories, both of the older and the newer creations. His remarks about the standards of administration shown in the canals and turnpike trusts suggest further inquiries about the social history of the early professional groups who helped both to run this society and to improve it: the schoolmasters and parsons, as well as the Dissenting Academies, that raised its level of literacy; the local attorneys who arranged so much of its business and helped widen the market for capital; the estate stewards who were in a strategic position to encourage agricultural improvement.

To a large extent such considerations affect the chapter on foreign trade, which I found the least satisfying. The difficulty of handling the statistical evidence, and the relative paucity of mercantile records so far discovered, make such a chapter difficult to write. There are few lives of the merchants to set against the lives of the engineers, and there are serious gaps in our knowledge of the commercial history of such ports as Bristol, Glasgow, Hull, even London. The upshot is a chapter which tends to be rather too descriptive and too static. There is less of the sense of the rivalry of Englishmen and Dutchmen, of the slow triumph of London over Amsterdam than one could wish for. And when all allowances are made for the dangers and defects inherent in the trade statistics, the decision to print Mrs. Schumpeter's table poses major questions about the growth of foreign trade upon which a somewhat more extended comment with Professor Ashton's acuteness would have been invaluable. How far were foreign trade and contacts uniquely significant in stimulating economic change? The export trades were often highly competitive, while the imports of cotton piece goods had helped create new fashions for Lancashire to supply, and imports of tea, coffee and sugar, were a major factor in the expansion of the potteries. Elsewhere Professor Ashton writes of the clear grasp shown by Arkwright of the link between industrial progress and changing habits of consumption. Such an analysis might be extended to foreign trade, with all its attendant stimuli to curiosity, comparison and the borrowing of foreign techniques.

It would seem captious to end by asking for more, because we hope there is more to come. Two topics, the history of fluctuations and the discussion of war and economic change, have been omitted and reserved for separate treatment elsewhere. And with his discussion of the government's war policy it would be admirable if we could be given Professor Ashton's con-

sidered verdict on the effects of government economic policy more generally. George Unwin emphasised that economic advance came from the spontaneous and voluntary activities of individuals rather than from the State, yet one needs to know how far such activities were affected or distorted by government action in this, the age of Adam Smith. Too modestly, Professor Ashton refers to his as a narrow window, but from it he has surveyed the eighteenth-century economic landscape more searchingly than any other historian, and this, his latest work, will both act as a landmark in the development of the subject and provide ample guidance for further exploration.

D. M. JOSLIN

Pembroke College,
Cambridge.

The Economics of Location. By A. LÖSCH. Translated from the second revised edition by W. H. WOGLOM with the assistance of W. F. STOLPER. (New Haven, Connecticut: Yale University Press, 1954 (London: Geoffrey Cumberlege, 1955). Pp. vii + 520. 60*s.*)

FOR one reason or another, the theory of location is almost entirely neglected in the Anglo-Saxon literature. There is the work of Hotelling, Lewis and Chamberlin and a few others, a number of empirical studies and that seems to be all. While we often hear of the importance of time to an understanding of economic events, the significance of space is rarely mentioned. Ohlin's *Interregional Trade* seems to be the only book in English which at least poses some of the more important questions of location. Palander's *Beiträge zur Standort'stheorie* (1935) is untranslated and rarely quoted, while Weber is probably largely unread. Moreover, even most of the German works date from the thirties.

There is thus a very real gap in our analysis which this book does a great deal to fill. It must be said at once, however, that *The Economics of Location* is not only a very long but also an extremely difficult work. Lösch, cultivating virgin ground, had to invent so many new concepts and to take up such a variety of novel points of view that he seems to have had little energy or inclination left for the task of communicating his ideas to others. His untimely death is also no doubt responsible for the lack of clarity. It would, however, be a great pity if this shortcoming were to mean the neglect of what, undoubtedly, is a book of the first importance.

The volume is divided into four parts: Location, Economic Regions, Trade and Examples. Of those, the part entitled Economic Regions is the most important. It is here that on the basis of a number of simplifying assumptions a quite remarkable general theory of market areas is developed. Starting with the production of a single good and the assumption of Chamberlinian tangency and an evenly distributed population, we are led through the familiar hexagonal-market-area analysis to a picture of interrelated market areas (economic landscape), with many goods, the location of towns

and ideal transportation networks. Modifications are then introduced to take account of the complexities of real life, and while this inevitably reduces the precision and generality of the argument, sufficient remains to make the results both interesting and practically important. The discussion of the effect of imposing relatively arbitrary political frontiers on an economic region is admirable and very instructive.

There is one complaint. The hexagonal market area is deduced from the assumption of zero profit (tangency). When this assumption is abandoned (as Lösch does only very rarely when discussing price discrimination and base-point pricing) it makes a great deal of difference to the analysis, and one would have liked to have this examined in greater detail. There is also the curious fact that in discussing the case of a discontinuously distributed population, gaps are allowed to appear between the hexagons, when the *raison d'être* of these is that they constitute one of three geometric forms which allow the filling of a space without corners and gaps. The argument here is far too compressed for comfort.

The part on location is also extremely interesting, although less original. It is here that Weber's theory is subjected to a searching criticism and Palander's work extended. The method of analysis in a number of cases is more familiar, since it has obvious contacts with linear programming. The chapter on town settlements is masterly, as are the chapters on agricultural and industrial location. The former should be carefully read by those interested in the theory of agricultural rents. The only really unsatisfactory chapter is the one on General Equilibrium Analysis. It is not that there is any objection to counting equations; it is rather the quite unexplained and fortuitous nature of the assumptions, for example that "the locations must be so numerous that the entire space is occupied" (p. 95). The functions used in setting up the equations are also insufficiently specified.

The part entitled Trade consists of an analysis of Interregional and International Trade in the light of location theory. Again it is quite impossible to summarise the many new and interesting propositions which appear here. But the spatial multiplier analysis deserves special mention, as does the criticism of the doctrine of comparative costs as applied to countries. The final part gives numerous examples lending some support to Lösch's theory of location and show what an extraordinarily wide knowledge of the facts he combined with high theoretical ability.

It is to be hoped that this book will stimulate further work in the theory of location. It would also be of great help if someone would write a companion volume elucidating the many obscurities and amplifying and explaining the numerous elliptic passages.

F. H. HAHN

University of Birmingham.

International Economic Papers, No. 5. Translations prepared for the INTERNATIONAL ECONOMIC ASSOCIATION. (London: Macmillan (New York: The Macmillan Company), 1955. Pp. 199. 15*s.*)

FOR the fifth number of *International Economic Papers*, the editors have chosen to pay a tribute to the golden age of Italian economics, the twenty years from 1890 to 1910. Three-quarters of the volume is devoted to contributions of that period—and chastening reading it is for anyone brought up in the Anglo-centric view that contemporary economics began sometime in the 1930s. The remainder of the volume consists of recent articles from a variety of languages, all of which are relevant to current English-language discussions.

The Italian papers are introduced by Luigi Einaudi's *Reminiscences* of fifty years of Italian thought—an affectionate ramble through the great names of Italian economics, distinguished by the author's deep understanding of what economics is about. Professor Einaudi lays great stress on the influence of Croce (" Don't think—calculate ") in turning Italian economics from historical generalisation to pure theory. His description of the failure to complete the next step after the elaboration of general equilibrium theory (successive approximation to reality) and his emphasis on elegance as the characteristic of subsequent work, suggest an intriguing parallel with the position of much contemporary economic theory, while the wealth of outstanding figures whose work is mentioned is an implicit rebuke to the Anglo-American habit of summarising Italian economics in the name " Pareto."

The golden age is represented by contributions from four of the great Italian economists, selected, most appropriately, by Professor Einaudi himself. Pantaleoni's " Some Phenomena of Economic Dynamics " (1910), which begins with an excellent description of economic dynamics in the narrow modern sense, is a suggestive discussion of four examples of historical change; the most interesting is " expansion and contraction of the area of economic activity," which comprises a detailed analysis of the ethic of the just price and remarks on the methodological implications of a restricted area of economic freedom. (Pantaleoni's attempt to demonstrate that expansion of the firm necessarily involves absorption of direct costs into overheads, however, rests on a subtle fallacy.) Pareto's encyclopædia article on " Mathematical Economics " (1911) is a masterly exposition, though its extreme compression makes it difficult to read; the footnotes, which alternate between references to " what V. Pareto has done," icy critiques of other mathematical economists and disdainful remarks about " literary economists " explain a certain coolness noticeable in Professor Einaudi's attitude towards him. Jannaccone's " Dumping and Price Discrimination" (1914) is a brilliant precursor of imperfect competition theory; its main argument, directed against Cabiati, is that dumping usually requires cartelisation or protection and is not dependent on decreasing costs, but the theoretical development includes a general analysis of price discrimination, in which product differentiation is viewed as a special case, and a clear statement of the relation between marginal and average cost. Barone's " Re-

lated Costs in the Economics of Transport" (1921) is a neat geometrical–mathematical examination of equilibrium under competition and various types of monopoly when alternative outputs are subject to a linear capacity restraint—though it could have been sharpened by use of the elasticity concept.

Of the recent articles translated, Dag Hammarskjöld's "The Swedish Discussion on the Aims of Monetary Policy" (1944) traces the successive arguments which have been used to defend Davidson's proposition that the price level should fall as productivity increases. Börje Kragh's "The Meaning and Use of Liquidity Curves in Keynesian Interest Theory" (1951) is a useful disaggregation of Keynes' curve into cash- and bond-holders' and public and banking system behaviour, together with an analysis of the different effects of different kinds of changes in the money and bonds to be held by the market. Kurt Rothschild's "The Effects of Devaluation on the Terms of Trade" (1954) seeks to revive the presumption that devaluation will turn the terms of trade against a country by appealing to the asymmetrical effects of certain aspects of imperfect competition—sales resistance which can be overcome only by large price cuts, selling at domestic list prices, negotiation of "reasonable" prices with large individual buyers—and the automatic worsening of terms on tourist trade. The argument is fairly convincing, though in parts it is asymmetrical or reversible, and dependent on the assumption that exports are a relatively small part of the firm's production. J. Tinbergen and D. B. J. Schouten's "National Income Accounts as a Means of Currency Analysis" is largely a discussion of purposes, concepts and methods, illustrated by application to the Netherlands economy 1951–53. H. Theil's "Who Forecasts Best?" (1954) develops a method of measurement and applies it to five European planning staffs. Not unexpectedly, the Netherlands comes out best, though Dr. Theil is sufficiently humble about the limitations of his method to refrain from bragging. The United Kingdom comes second, partly through forecasting fewer magnitudes —a ploy which has now been carried to its logical conclusion.

The ten articles together make a well-rounded and interesting volume, well in keeping with the standard and functions which the editors have set themselves.

HARRY G. JOHNSON

Manchester University.

Economic Change. Selected Essays in Business Cycles, National Income, and Economic Growth. By S. KUZNETS. (London: Heinemann, 1954. Pp. viii + 333. 15*s*.)

Theory of Economic Dynamics. An Essay on Cyclical and Long-run Changes in Capitalist Economy. By M. KALECKI. (London: Allen & Unwin, 1954. Pp. 175. 18*s*.)

THESE two books by outstanding economists have much in common. Both reprint material largely but not entirely published previously. Both authors have made somewhat the same spiritual pilgrimage, beginning with

business cycles, then advancing to growth theory and on to the problems of underdeveloped economies. Indeed, this might almost be declared to be archetypical for the contemporary economist, so frequently has it happened.

But there, on the level of superficialities, the similarity ends. Where could one find two more violently contrasting intellectual temperaments? Mr. Kalecki optimistically erects the most vast and beautifully airy structures, and only afterward does he begin to worry about the solidity of the underpinnings. Professor Kuznets sinks his piles deep in the spongy morass of economic fact; he weaves great rafts to float the massive abutments which he painstakingly builds up bit by bit. And then, just when we long to see what great construction he will build on it all, he leaves it to go and sink another pile. Is it because he still does not trust his foundations, or possibly is it that he is ill at ease with any theoretical structure?

It works out as a division of labour. Professor Kuznets lays the foundations, others can (and have done so with much gusto) build a variety of structures on it. This evidently is not, however, the view of Professor Kuznets. He is distrustful of theories claiming to have statistical foundation; what, one wonders, would he have to say about Mr. Kalecki's rather impressionistic use of statistics? His review essay on "Schumpeter's Business Cycles" gives a hint: "The theoretical model . . . does not yield a serviceable statistical approach. The three-cycle schema . . . cannot be considered, on the basis of the evidence submitted, even tolerably valid; . . ." Schumpeter, like Kalecki, once constructed an ingenious cycle theory, and he also tried to show that his theory explains the known facts. The chill reception of that monumental labour was a personal tragedy to Schumpeter, but more than that it may be taken as symbolic for the substantial failure of the bulk of econometric work to date.

Most economists associate the name of Kuznets with national-income research, but they have only to read some of the essays in this book to see the distinction he has brought to work in quite different topics. Thus "Retardation of Industrial Growth" is a summary of his basic work on the growth pattern of particular industries. He found strong evidence for a common behaviour to all new products, similar to that of a new biological species introduced into a favourable milieu. There is first the accelerating growth and then retardation leading to a saturation level according with the logistic curve of population theory. That empiricism, just as well as pure theory, can lead us into error, can be seen from the fact that the Kuznets logistic for steel output in the United States predicted saturation at around 40 million tons, whereas it is now over 100 million tons and the end is not (or is it?) in sight.

Perhaps the essay most to be recommended is the "Relation between Capital Goods and Finished Products in the Business Cycle," a superior piece of work written over twenty years ago. There is perhaps still no better critical exposition of the accelerator with treatment of its inadequacies,

desirable complications and failure to conform to the known facts. A thorough analysis of railway data is given to show that though equipment leads, it does not lead by a quarter cycle, and though its amplitude is magnified, it is not magnified as much as the theory would lead us to expect. Therefore " This relation is inadequate as a self-sufficient theory of cyclical fluctuations." But this had already been shown on narrowly theoretical grounds by Professor Frisch and is now known to everyone as the Harrod growth theory. Worse still, even if we accept all the criticisms made by Professor Kuznets, the amended theory can still be made the basis of a cycle theory.

There is much else of interest in these essays on statics and dynamics, equilibrium, trend and cycles, the meaning of national income in backward areas, international comparisons of income levels, national income and welfare, present economic tendencies and the impact of foreign economic relations on the United States economy. Some of this is dull indeed, but most of it is good, and some very good. The essay on welfare is a splendid performance and interesting, especially, because Professor Kuznets is recoiling from the vulgar empiricism of the hosts of national-income computers that he helped to create. He comes down firmly on the side of the angels by declaring roundly that net national-income data have no meaning separated from the welfare theory that begot them.

The *Theory of Economic Dynamics* consists essentially of Mr. Kalecki's two previous books, which have become justly famous and need no particular notice here. The title is pretentious, since there is no attempt to cover systematically the subject indicated. Some parts have been rewritten, and the statistical foundations (*pace* Professor Kuznets) have been widened even if not deepened. In fact, Mr. Kalecki disarms his potential statistical enemies before battle can be joined by stating that his only purpose is " to obtain first approximations for illustrative purposes."

On two important issues substantial new material is included. The original Kalecki Model T assumed the coefficients to be such as to give an undamped cycle, on the grounds that in fact cycles do not disappear. This simple error in logic was so severely criticised by Professor Frisch that the model has never been seen again. Now Mr. Kalecki accepts the criticisms and incorporates in his model Slutsky's famous result: that random shocks will give rise to continuing and irregular cycles in an auto-regressive model, and that these cycles look very much like the same sort of thing as trade cycles. This, of course, does not establish that they are trade cycles. There are in fact two ways of explaining the maintenance of oscillation—shocks and non-linearities.

The second new element is a section on long-run economic development. This follows conventional lines by assuming steady growth in certain " constants "—the consumption outlay of capitalists, the total value of salaries, and indirect taxes. Since his system is linear, this gives rise to a trend; this trend is separable from the cycle, and we have the kind of model which will generate a time series which may appropriately be decomposed

into trend and cycle. These elements are surely not the deeper springs of economic growth, but they may be useful manifestations of growth tendencies, how useful will require a lot more statistical work to reveal.

R. M. GOODWIN

Peterhouse,
Cambridge.

Capital and its Structure. By L. M. LACHMANN. (London: Bell, for the London School of Economics and Political Science, 1956. Pp. 130. 15*s.*)

CAPITAL has structure because stocks of capital instruments can be distinguished from one another in several ways. Types of instruments differ according to method of construction, mode of operation and age; while between stocks, the proportions of types differ. A convenient and traditional classification of differences in structure is under the three heads—quantities of inputs, techniques and age distribution. Capital theory attempts to describe capital structure, and explain why a particular structure is chosen or exists under certain circumstances. Theory also attempts to relate the structure to the distribution of incomes and to changes in aggregate income. In some economic situations the capital structure may be considered unimportant—in the sense of being uninfluential and uninfluenced—and consequently the analysis of those situations will not be based upon any capital theory. An example is the Keynesian short-run trade-cycle analysis. But there is always the possibility that the omission of capital structure and its more important relationships will weaken an analysis.

The propositions of capital theory—made mainly by the Austrian school—have always been in dispute. Böhm-Bawerk attempted to describe summarily the state of technique by an interval of time called the period of production (the more advanced or "roundabout" the technique, the longer the period) and proposed an inverse relationship between the rate of interest or profit and the period of production. Wicksell proposed a direct relationship between the real wage-rate and the period of production, thus systematising Ricardo's famous proposition. This latter aspect of the theory was developed by Professor Hayek, Mr. Kaldor and others, who examined the necessary financial, managerial and market settings within which the analysis was true. Hayek has critically examined the premises of capital theory, and it would seem that his rejection of the older, simple theories on the grounds of a lack of both logical perfection and generality, in favour of a general equilibrium approach which permits no useful, if approximate generalisations, condemned capital theory to its recent sterile decade and a half. The success of the Keynesian analysis of depression and inflation, and the lack of interest shown by its users in the capital structure, reinforced the condemnation.

As attention turns once again to economic growth, and as more refined and realistic cyclical models are developed, interest in the theory of the

capital structure has revived. There are statistical studies of the ratio of capital to output; Mrs. Robinson has revived the problem of the definition of capital; several productivity studies have pointed to varieties of automation being induced by prevailing or expected cost structures.

Professor Lachmann's study is thus timely. He re-emphasises the facts that capital goods are heterogeneous and have different uses, and that different instruments are usually complementary. Investment is concerned with changes in the composition of the capital stock. Into this framework expectations are introduced. Decisions are based upon expectations, and outcomes and revisions of expectations lead to revisions of plans and changing structures. Unexpected change necessitates frequent change in the capital structure. Professor Lachmann argues that changes in money balances, new investment and idle capacity must be interpreted as the incidental results of the process of failure or success of expectations. He revives a Hayekian world when he says that plans are co-ordinated and structural maladjustment prevented by stabilisers, of which the foremost is the flexible price system, particularly forward markets and the stock exchange.

Dealing with accumulation, Professor Lachmann is both specific and stimulating. Accumulation allows a higher degree of division of capital (similar to division of labour), the specialisation of capital taking the form of an increasing number of processing stages and a changing composition of the raw material flow. New indivisible resources can be used which account for increasing returns to capital, and these increasing returns are what is meant by the higher productivity of roundabout methods of production. As a structure becomes more complex it becomes more vulnerable, and the achievement of stability will be an unlikely feat. Thus a regularly progressive economy is unlikely for several reasons. On the subject of the trade cycle, Professor Lachmann discusses the part played by structural maladjustment in a strong boom. Lack of effective demand may be confused with a lack of complementary factors arising from sub-ceilings, particularly in the production of raw materials. It appears to your reviewer that this type of analysis is useful in studying post-war United States fluctuations, which have been of the strong boom, sub-ceiling type, the recessions being taken up with a rapidly achieved adjustment of capital structure, partly in the form of a reduction of working capital.

Professor Lachmann is consciously reviving the controversies of the 1930s, and some of his views, for example, on the influence of the price structure upon the incentive to invest (p. 50), and the stabilising effect of the price system (Chapter IV), appear naïve and polemical. The weaknesses of the book are that, despite the lengthy treatment, there is always vagueness about the description of structure; the chapter on (financial) asset structure is superficial and really unnecessary; and no attempt has been made—except in very general " non-operative " terms—to relate the choice of a capital structure to real wage-rates (or real input prices) and interest rate. In following Hayek so faithfully, Professor Lachmann has

discarded some of the few, useful tools of any capital theory, and the uninitiated will be left with a barrage of airy words (of which those like " morphology of the forms " and " multiple specificity " are hardly appealing). However, there are some sections of the book which are worth reflecting upon—that on the strong boom (Chapter VII), and that on economic progress (Chapter V). There, in fields where is it unusual to say anything fresh and sensible, Professor Lachmann is stimulating.

C. A. BLYTH

Pembroke College,
Cambridge.

Deux Essais sur le Marxisme. By JEAN MARCHAL. (Paris: Éditions Génin, 1955. Pp. 261. 750 frs.)

THIS book consists of two long essays: the first, " Marxism as a general conception of Man and of the World "; the second, " Marxism as an instrument of analysis applied to the division of the national income." In France there is a number of economists and sociologists, among whom M. Jean Marchal is a leading figure, who neither reject Marxism as something unclean nor embrace it in its totality with blind and uncritical zeal. They try to find out what contribution it can make to our understanding of man and of society.

The first essay consists of two parts. In the first the author expounds, without criticism, the main outlines of the Marxist system—philosophical, historical and socio-economic. This he does very clearly and fairly. In the second part he selects what he considers to be its valid parts. He accepts (with qualifications) both the labour theory of value and the theory of surplus-value. Concerning the former he makes the point that it is a valid macro-economic theory as applied to the relative value of large aggregates of commodities (*e.g.*, consumer goods as compared with capital goods, wage goods and luxury goods, export goods and home-market goods), thus by-passing Böhm-Bawerk's criticism that to aggregate values over the *whole* economy reduces the theory to a meaningless tautology.

The second essay is much more substantial. In it M. Marchal first expounds the Marxian theory of income-division in modern society, and then attempts to establish what parts of it can be used to-day as a valid instrument of analysis. In the first, expository, part, the author gives a very clear and accurate account of Marxian theory, but he adds little that is new. He emphasises three aspects of the Marxian theory. It is macro-economic, dealing with large aggregates, able to transcend the limits of the individual or the firm, and hence to take into account tendencies affecting *all* individuals and firms and also such phenomena as state-imposed modifications of the income-scheme through taxes, subsidies and pensions. It operates with a very long time-perspective (longer than Marshall's " long run "). It is sociological; in the matter of income-division it makes use of sociological categories (classes) rather than analytical ones, such as factors of production.

These characteristics, he considers, make the theory a suitable instrument for the analysis of income-division in modern society. In the second part he examines more closely the strength and weakness of the Marxian theory; he proposes to retain these three above-mentioned characteristics, while modifying (or abandoning) some of its content, as originally expounded by Marx and as accepted by Marxians.

For instance, Marx makes the primary sociological division between wage-earners and the rest (comprising the capitalists and their associates and hangers-on). M. Marchal sees in modern industry not two but three clearly marked groups: wage-earners, capitalists and salaried staff (" cadres "). He gives the following definition of a " cadre ":

> " He is an individual who, because he has had a reserve of money or property, or more generally, *because social institutions have allowed him to*, has enjoyed the possibility of not selling his labour at once on the market, of adopting, in Böhm-Bawerk's sense of the word, a *roundabout* use of his time in acquiring knowledge, and, consequently, of conferring a higher efficiency and scarcity upon the labour he supplies afterwards, and of thus enabling him to sell this labour for a higher remuneration." (Author's italics.)

Outside industry he distinguishes at least *one* other group of great social significance and two or three other less important groups. The first is that of working proprietors in agriculture (French peasants, American farmers), whose fundamental conflict with *all* the urban groups is reflected in the relation between agricultural prices, on the one hand, and all industrial wages, salaries and profits, on the other. The minor groups are lenders of money (rentiers), non-working proprietors (landlords) and small business-men. None of these, he thinks, can be just lumped together as " dependants of the capitalist class " or as " decaying remnants of an earlier social order." The task of an adequate theory of income-division is to explain the mode of formation and the magnitude of the shares of these four major and three minor sections of the community.

With respect to the first major group, the industrial wage-earners, M. Marchal gets into heavy weather because he tries to hold fast by the Marxian concept of wages as a subsistence minimum. He does not deny that in modern industrial societies wages are far above the *physiological* subsistence minimum. But he argues in favour of a *sociological* subsistence minimum, determined by custom and expectation. Nevertheless, he is perfectly aware of the reciprocal relation between actual wages and the customary standard of life. (Are real wages high because the worker's customary standard includes prime steak and a T.V. set; or does the customary standard include prime steak and T.V. because real wages are high?) Singularly enough, in spite of the impressive work of Colin Clark and of Paul Douglas and his associates, M. Marchal denies that there is any relation between productivity and wages in the case of labour as a whole, although he admits the possibility of such a relation (a short-run, micro-economic one) in the case of particular occupational groups.

". . . Productivity may quite well explain differences in wage between one man and another or between one kind of work and another, without exercising any effect upon the general scheme.

For our part, we do not believe that it has ever been seriously established that in the economy as a whole (*à l'échelle globale*) the productivity of labour has had any influence on either the absolute or the relative share of the working-class in the national income. This influence is possible, it has not been proved. Certain facts seem even to lead to a denial of it. It will be noted particularly that the French working-class received, in 1951, an aggregate real wage that was not perceptibly higher than that of 1938, while between these two dates its number had increased slightly, the effective working week had been increased from 40 to 45 hours, and, finally, average productivity had increased."

M. Marchal also draws attention to the problems of subdivision of income between the lesser sections of the main groups. For the subdivision of profit between various kinds of capitalists—industrial, commercial, money-lending, etc.—Marx has left some important suggestions. These need to be supplemented by modern studies, in view of the growth of capitalist monopoly which introduces a new source of divergence between prices and values. Marx made no contribution to the equally important problem of the wages received by different kinds of wage-earners. M. Marchal suggests that the omission was deliberate, since Marx was concerned, for political reasons, to emphasise the unity of the working-class, and may well have thought that a discussion of the differences between skilled and unskilled labour, urban and rural workers, etc., might be damaging to working-class solidarity.

In a general discussion of Marx's theory of the " laws of motion of capitalist society," M. Marchal rejects the Marxian concept of laws of social evolution and proposes to replace them by tendencies and " lines of slope."

In the space of this review it has been impossible to deal adequately with the whole range and richness of M. Marchal's thought; but it must be said that this is a very stimulating book, containing many ideas that, in the reviewer's opinion, can very usefully be applied in economic analysis.

H. D. DICKINSON

University of Bristol.

David Hume: Writings on Economics. Edited by E. ROTWEIN. (Edinburgh: Thomas Nelson, 1955. Pp. 224. 30*s.*)

THE economic essays of David Hume have never suffered from neglect. This has no doubt been due in part to Hume's eminence as a philosopher, in part to the intrinsic merit of the essays themselves. Not always as original as is often claimed, they nevertheless command attention by virtue of their scope, lucidity, forcefulness and good sense. It is well that they have been collected and reprinted in one volume, along with a few letters on economic topics written by Hume or written to him by Oswald, Tucker and Turgot.

It is a pity that Dr. Rotwein's introduction, comprising almost exactly one-half of the book, should stand, like Wordsworth's Michael, " something

betwixt a hindrance and a help." It betrays more than a few traces of its origin as a Ph.D. thesis, and is written in an English style which is at best a sad contrast with Hume's own and which is occasionally nothing short of deplorable. Dr. Rotwein expresses the opinion that Hume is " deserving of special distinction " in " the general quality and breadth of [his] analysis " (pp. cv–cvi). But the introduction is not a general review of Hume's economic writings, nor is it an assessment of his place in the history of economic thought. Instead, it is devoted to an attempt to show that all Hume's work, both economic and philosophical, is unified and dominated by his conception of human nature—his " psychology "—and by his interest in historical change. Although building on rather inextensive foundations, Dr. Rotwein provides a stimulating appraisal of Hume's views on the motives to economic activity, and is able to utilise his account so as to illumine what Hume says about the rate of interest. The attempt to prove Hume's concern with " well-defined historical laws of behaviour " (p. xxiii) is rather overdone, but attention is drawn to an interesting discussion in the letters about the consequences of economic development for international trade. Unfortunately, Dr. Rotwein is so concerned to establish connections between the *Treatise of Human Nature* and the essays that he relegates to footnotes almost all mention of the work of other economists, thereby making Hume's ideas seem much more peculiarly his own than they were. Also he is inclined to distort Hume's thought by re-wording and by over-insistence on the degree to which Hume anticipated some modern discussion. We are told, for example, that in the essay " Of Money " Hume " makes explicit his initial assumption of less than full employment and . . . his analysis contains a relatively detailed and highly lucid account of the multiplier process " (p. lxviii). Whatever justification there may be for comment of this kind—and usually there is not much—it appears to rest on the cardinal error that writers of the past deserve a good mark when they can be represented as in agreement with the latest ideas and the up-to-the-minute approach. Usually, the advantage of studying them is that they cannot be so represented—or misrepresented.

Most readers of this book—certainly those coming to Hume's essays for the first time—would be well advised to read Hume first and Dr. Rotwein afterwards.

A. J. YOUNGSON

Emmanuel College,
Cambridge.

Readings in Fiscal Policy. Edited by A. SMITHIES and J. K. BUTTERS for the American Economic Association. (London: Allen & Unwin, 1956. Pp. 596. 30*s*.)

THIS volume follows the familiar pattern of the A.E.A. *Readings* series with a wide selection of articles covering various aspects of fiscal policy such as the control of inflation, the maintenance of stability and the effects

on the national debt. Many of the articles are classics in their own right—for example, Keynes' open letter to Roosevelt of 1933, Myrdal's 1939 article on fiscal policy in the business cycle, Haavelmo's contribution on multiplier effects of a balanced budget and so on. The editors have on this occasion not restricted themselves to articles, and extracts are given from Keynes' "How to Pay for the War" (misquoted, however, as published in 1949), Schumpeter and Hansen. There is a useful thirty-page bibliography at the end of the volume.

Students of economics will undoubtedly find this volume a useful and convenient guide to the literature on the subject. One wonders, however, whether it quite lives up to the standards set by its companion volumes in the series. The trouble is, I think, partly that fiscal policy in any distinct sense of the phrase is not a subject meriting a whole volume of readings to the same degree as, say, price theory or international trade, more especially as (according to the editors) a volume on Public Finance is envisaged in the series. The attempt to blow the subject up to full size results in the inclusion of some material which is mainly of interest to the historian of economic thought, the invasion of what I should have thought was certainly the field of monetary rather than fiscal theory (for example Tobin's "Liquidity Preference and Monetary Policy") and a positive rash of articles duplicating one another on the different fiscal routes to full employment.

Quite apart from the definition of the subject the selection of articles does not seem entirely happy. No two pairs of editors would ever agree in their choice, but presumably the main principles of selection must be that articles should be included either for their inaccessibility, the necessity to cover a particular part of the field or the originality or importance of the contribution to some topic. On the inaccessibility criterion, it is a little strange to find that, in a volume primarily designed for American readers, out of thirty-four contributions, only three were published outside the United States: the two by Keynes mentioned above and Colm's 1948 *Public Finance* article. To give good coverage of the subject one would have thought that one of the articles (by Milton Friedman or A. W. Phillips) dealing with the possibilities of Government fiscal intervention being destabilising rather than stabilising should have been included. Nor, for that matter, is anything included on the more practical problems of planning public works, devising agricultural support programmes and the like. Indeed, the heavy concentration of articles written between 1942 and 1949 and dealing with war or immediate post-war problems, to the exclusion of some other subjects, gives a curiously dated air to the whole volume. Finally, there is the criterion of the importance or originality of a contribution. It is a little hard for a British reviewer to cavil at the selection on this score without being accused of intellectual chauvinism. But on any grounds parts of Kingsley Wood's 1941 Budget Speech and the accompanying National Income White Paper (both partly drafted by Keynes) have very special claims for inclusion in a volume of this sort. And it may not be unreasonable to point out that the British *Employment Policy* White Paper of

1944 and Beveridge's *Full Employment*, with its well-known Appendix C by Kaldor, preceded the contributions on these topics selected for this volume.

As a record of how Americans, economists and others, were gradually converted to Keynesian ways of thought in the fiscal sphere this volume is full of interest. But this is not quite the qualification needed to recommend it to British readers as a synoptic view of the territory, despite the excellence of many of the individual contributions.

A. R. PREST

Christ's College,
Cambridge.

British Incomes and Savings. By H. F. LYDALL. (Oxford: Basil Blackwell, 1955. Pp. 274. 32*s.* 6*d.*)

THE Oxford University Institute of Statistics has now carried out four large-scale annual surveys of income and savings in British households, and readers of the Institute's *Bulletin* will already have seen a number of papers on their results by Mr. Lydall and his colleagues. Mr. Lydall has brought together those describing the first (1952) survey in a " more permanent and convenient form." The data, which relate to the financial year 1951–52, were obtained by interview from some 2,600 people in sixty-nine town and country areas, chosen with the intention of forming a representative cross-section of the 22 million " income units " in the private households of Great Britain. That the Oxford samples, and most of the subsequent analyses, are based on " income units " (single persons of eighteen or over and married couples, together with their dependants) rather than on households (defined usually as groups of people sharing a common table or contributing to a common pool of expenses) is in itself a novel feature in this country, and one well adapted to the main purposes of the inquiry. The present report contains a detailed description of these income units in respect, broadly, of their sources and distribution of income, of their ownership of assets, and of their personal savings and total consumption. As an aid to those who wish to compare the findings with those of other British studies, a substantial chapter discusses the distribution of incomes, rent and rates in terms of the household as a unit. And of course we may agree with Mr. Lydall that here " there is a rich mine of data on a wide variety of problems. It can be used to answer such questions as: Who are the poor? What are the incomes and occupations of people living in council houses? How are rents related to incomes? What sort of people belong to national savings groups? " and so on.

But what is the general picture which emerges from this work, judged as a study of personal savings? Alas for those who may hope to gain a facile insight, to see a simple and pure form of the savings function emerge from the foam of data! As we leave the arid shores of aggregative analysis we must take arms against a sea of new troubles. Influences which in aggregate we can ignore because they cancel each other or because their net

effect is roughly constant over long periods become important when we study individual cases, and mingle with others which may shift substantially and rapidly as the economic climate changes. For example, the comparison of savings with income results in what is now a familiar pattern in such cross-section studies:

> "The groups whose [gross] incomes range from £200 to £800 embrace more than two-thirds of the population and receive more than two-thirds of total income; and their net saving is practically nil. Real leverage is exercised, on the negative side, by 24 per cent of income units whose gross incomes are less than £200—and who receive 7 per cent of total income—and, on the positive side, by 7 per cent of income units with incomes of £800 or over—who receive 25 per cent of total income."

But what sort of persons do we find at these two extremes of the income distribution? In the lowest group we find mainly old, retired persons and widows who are running down assets accumulated during working life; and in the highest mainly earners between the ages of thirty-five and fifty-five (with their dependants) who are saving not only because their high incomes make it possible but also in preparation for old age. To find a net relation between income and saving we must therefore take account of the age of the head of the income unit; and not only of age, for Mr. Lydall has also given tables showing the influence of the sex and occupation of the head, of the number of persons in the unit, its geographical location, housing tenure and so on. These tables will repay careful study, though, as they usually show only the gross influence of each factor taken separately, it is not possible to push analysis much farther than Lydall himself has done in the text.

Altogether this is a welcome addition to the reference library of economists and statisticians, and should stimulate much further research. May I, however, be permitted a personal cavil at the use of Pareto-type charts to display income distributions which do not in fact follow Pareto's law? Because the points plotted on these charts do not represent independent observations their interpretation is not always unambiguous; this price is not worth paying if the Pareto transformation is not justified *ex post*.

J. A. C. BROWN

Department of Applied Economics,
University of Cambridge.

Economic Control. By M. P. FOGARTY. (London: Routledge & Kegan Paul, 1955. Pp. 324. 21*s*.)

THE British economy is not completely planned like the Russian; it is certainly not completely competitive. But merely to call it "mixed" does not tell us much about its functioning. What in fact makes it tick? What determines how its resources are devoted to various ends; what decides its rate of investment or its distribution of consumers' incomes and

so on? Professor Fogarty's theme is that the economy is controlled partly by direction, partly by competition, largely by "consultation." He examines the working of these three instruments of control in the fields of consumption and savings; investment and research; physical and mental health; population; and of trade and investment, both international and inter-regional. He concludes with some general reflections upon the relation between economics and the other social sciences and upon the pattern of the economy itself.

To set out the scope of the book in this way—even though the description follows closely the author's own table of contents—is to give a somewhat false impression. The reader need not look here for a completely integrated, schematically perfect theory of the economics of the Welfare State. He will find rather a series of animadversions upon the rapidly changing scene of to-day, strung somewhat loosely together, but none the less possessing a certain unity, which derives from Professor Fogarty's own ethical approach to economics. At times the book seems to be All About Everything; and the reader will need a good deal of knowledge of the economic, social and administrative background of our day if he is not to be put off by the writer's allusive style. Yet it is worth while persisting; for Professor Fogarty's is an able and original mind which illuminates our numerous institutions as it darts about among them.

There are some very shrewd comments upon the possible extent and the inevitable limitations of "direction" in the economy. Professor Fogarty feels that the obvious fact that direction "is likely to prove useful only where it is already known what changes in the social structure are required, and by what means these changes, or routine activities within a given social structure are to be carried out" has been neglected both by industrial managers and by the State. But direction often fails as a means of control, not only because an attempt is made to apply it where it cannot succeed, but quite simply because of the inability of the directors "to grasp and sort out the issues involved quickly enough to keep pace with the events." The limit is set by the amount of work they can handle in the day. State economic direction "can control *this* service or *that* service or *the other* service as efficiently as could be done with any other sanction or mechanism. But if State direction were used for *all three*, the pressure on administrators would be such that none of them would be operated as speedily or as precisely as citizens or consumers desire." Some economic purposes can be achieved as well by direction as through competition; "but, allowing for all possibilities of delegation and scientific management the *total* number of things which can be done well by State direction is limited . . . the case for limiting the field of State management rests, not on the dangers of a strong State, but precisely on the need to allow the State to do with greater power those things which no other agency can do so well."

Professor Fogarty does not believe that the State will so learn by experience to effect more and more complicated control that it will be able gradually to extend and perfect the power of direction over wider and wider

fields. "There was a liberal age. There has been, recently ended, a socialist age. And an age now seems to be opening which might best be called federalist." The hall-mark of the latter age is "consultation," which we see already at work within firms which adopt modern management practice; in trade associations and trade unions; in the National Joint Advisory Council and the National Production Advisory Council for Industry; in the International Labour Organisation and in many similar institutions. (Incidentally, it seems to me that he overestimates the significance of Development Councils and greatly underestimates that of the N.J.A.C.) If someone were to make a study—based perhaps upon an analysis of their desk diaries—of how industrial tycoons spend their time, a picture very different from that of the classical "entrepreneur" would emerge. As Professor Fogarty puts it: "the socialist age has largely socialised the business man, along with everyone else." He has become acutely aware of the problems of group relationships, while the great majority of wage-earners and small salary earners have become "middle class" in social status, and tend to become increasingly so in outlook.

The interaction of these changes in the nature of "control" with the development of the economy is discussed and illustrated with frequent resort to tables, and there is a bibliography of fifteen pages. It is a book well worth reading by both economists and administrators.

H. A. MARQUAND

London.

The Federal Antitrust Policy. Origination of an American tradition. By H. B. THORELLI. (London: Allen & Unwin, 1954. Pp. v + 658. 60*s*.)

DR. THORELLI has not attempted to provide another description or economic appraisal of Federal anti-trust policy in action. Indeed, his book is not to be regarded as a technical economic study at all, for his purpose has been far more ambitious. He has been concerned, first, to disclose the springs of action that produced the Sherman Act in 1890 and, secondly, to explain the emergence during the next thirteen years of anti-trust as a permanent constituent of American economic policy. This has required him to embark upon a detailed study of legal doctrines and practices, constitutional theory, political institutions, administrative policy, industrial organisation and economic thought, both professional and popular. In spite of the wide scope of his inquiry, he has not relied merely on secondary sources, but has undertaken a substantial amount of original research which has been very fruitful. Having been trained in law, economics and political science, he is well equipped to provide the kind of synthesis for which social scientists usually seek in vain. Since this account of the origins and development of what has long been established American economic policy comes at a critical moment in the evolution of British monopoly policy, the book can claim the close attention of readers in this country.

The work is divided into three parts. The first deals with the common-

law background, the economic, social, political conditions and ideas in which the policy was rooted, and finally the enactment and provisions of the Sherman Act itself. Part Two, entitled " From Form to Substance," covers the period from 1890 to 1903 and traces " the interaction between economic and political trends, administrative policy, and court decisions prior to the establishment of the Anti-trust Division and the Bureau of Corporations in 1903." In Part Three (" Antitrust Institutionalized ") the author gives a summary of his arguments and conclusions.

Dr. Thorelli provides an informative discussion of the complex factors which produced the Act. In the background there was the common law, hostile towards combinations in restraint of trade, although itself never an effective means of curbing monopoly or encouraging competition. There was also the strong American sentiment in favour of individualism and " economic egalitarianism," a sentiment that was offended by the industrial developments after the Civil War and outraged by the discriminatory and predatory practices of the railway concerns. After 1880 antagonism to these practices was directed towards those of monopolies in general. Dr. Thorelli gives much attention to the controversial question whether or not the Act really came in response to an " irresistible tide of public opinion," but in the end he suspends judgment. He is able, however, to reach more definite conclusions about the influence exerted by economists. On the whole, the academic economists before 1890 showed indifference to anti-trust. This was partly because they were wedded to *laissez-faire* doctrine, and partly because they believed that the competitive forces in the economy were too strong to permit monopoly to survive. Those who realised the significance of the trend towards large combinations and the incompatibility of such structures with competition as understood in classical economics, were disposed to argue that there would always be sufficient *potential* competition to prevent abuse of a dominating market position, while others laid stress on the economies to be derived from large-scale organisation. Even Ely opposed attempts at regulation. Where combinations proved to be dangerous to the public interest, he thought, the conclusion was that they were suitable for public management. Support for anti-trust measures came rather from the popular writers on economics and from publicists.

The Sherman Act, though preceded by much state anti-trust legislation, did not lead immediately to effective action. Dr. Thorelli does not take the view that the courts were mainly responsible for this weakness. He shows that Congress did not at first realise the necessity for continuous, official regulation and trusted in the " capacity for self-enforcement of the law." Moreover, the law officers of the nineties were former corporation lawyers with no great love for the anti-trust policy, and the administration in general was lukewarm. With the formation of the great industrial consolidations of the later nineties, it appeared for a time that the Sherman Act was powerless to stem the trend towards monopoly. Yet by 1903 the convergence of several streams of influence had firmly established anti-trust as an American institution. This came about partly as a result of various court decisions,

and partly through public reactions against the movement towards industrial concentration which left " many of its boastful promises unfulfilled." But the most important factor was the recognition during the Roosevelt presidency that effective anti-trust action required the continuous attention of the administration, and that the executive must supply the initiative in enforcement. Consequently, in 1903 a special division for anti-trust enforcement was created in the Department of Justice, and for the first time Congress earmarked funds for enforcement. The author traces the evolution of this policy in much interesting detail.

G. C. ALLEN

University College,
London.

Beyond Nationalization. The labor problems of British coal. By G. B. BALDWIN. (Cambridge, Mass.: Harvard University Press (London: Geoffrey Cumberlege), 1955. Pp. 324. 35*s*.)

ONE of the main arguments used to justify the nationalisation of industry was that it would bring a new standard of industrial relations. Since men and management would no longer be influenced by the profit motive, the old conflicts, it was argued, would give way to a common endeavour to reach public-welfare goals. Whatever doubts there might have been about the general validity of this argument among non-socialists, there was, even in the sceptical section of the community, a feeling that so far as the coal industry was concerned nationalisation was probably the only answer to the bitter hatred that had long marred relations between workers and employers.

It may well be that had nationalisation not taken place, industrial relations would have gone from bad to worse. This, however, we shall never know, but we do have the experience that nationalisation has not of itself provided the key to harmonious industrial relations. This book, which is the most thorough study of industrial relations in a nationalised industry yet made, clearly establishes that the difficulties experienced in the coal industry transcend the issue of ownership. Such problems as absenteeism, recruitment, wastage, methods of wage payment, unofficial strikes, the transfer of labour, rival unionism, joint consultation have, the author shows, " an existence of their own which is largely independent of the form of industrial ownership."

Nationalisation may, in fact, have made the solution of some of these problems more difficult, not because the mines are now publicly owned, but because public ownership has made possible technical and institutional changes in the interests of efficiency, which have provoked frustration, antagonism and irresponsibility. Nationalisation has, for example, necessarily involved the creation of a massive structure of administration; the vast capital-development programme has led to growth in the size of pits and an increase in the scale of production units. From a purely technical point of view these changes can be amply justified, but size—as Professor Revans

has convincingly demonstrated in his pamphlet for the Acton Society Trust, *Size and Morale*—is intimately linked with morale in the mines. It is generally true to say that the bigger the scale of coal production, the more likely will it be that strikes will occur, absenteeism rise and accidents happen. Mr. Baldwin has not investigated the influence of size, though he is aware of the problem, but he has paid considerable attention to the effect of other technological factors on industrial relations.

The influence that is exerted by the technical conditions of production is extremely important, but has been largely neglected in studies of industrial relations. It is the great merit of Mr. Baldwin's book that he has brought out the special significance of the technical factors in the mining industry. He indicates how they shape the pattern of collective bargaining, determine the structure of wages and condition the attitude of men and managers towards each other. In a foreword Professor John Dunlop, in my opinion, rightly suggests that comparative international studies of other industries would show that the technical conditions of production are pervasive factors moulding industrial relations. Miners, for example, everywhere exhibit roughly similar behaviour patterns, so, too, do dockers, railway, textile, printing and building workers, as has been shown by Clark Kerr and Siegel in their study "The Interindustry Propensity to Strike—An International Comparison" (included in *Industrial Conflict*, Ed. Kounhauser, Dubin and Ross, New York, 1954).

Mr. Baldwin thinks that the changes in mining technology that are coming about through intensive effort to find new ways of mining coal, will in the long run produce effects that will make for better industrial relations. "The promise is one of small groups . . . it is one of day rates instead of piecework; it is one of varied individual tasks rather than rigid specialisation; and it is one of operating flexibility." The significance of these advantages has, Mr. Baldwin thinks, just begun to be appreciated in the industry, and he concludes his book with the hopeful opinion that in the next decade an increasingly conscious effort will be made to attain them. Unfortunately traditional practices probably take longer to die in mining than in any other industry. The miner, whatever the colour of his politics, tends to be deeply conservative. It will not be easy, for example, to change over from a system of piece-rates and allowances, even though it is perfectly obvious that they positively stimulate aggression and conflicts, to one of day rates. The problem would be very much easier if the National Union of Mineworkers were able to give a clear and definite lead to its members; unfortunately the union has not been able to rise to its opportunities. The great mass of mineworkers have little contact with their union, and they often behave as if they have little confidence in its leadership.

B. C. ROBERTS

London School of Economics.

The Rebecca Riots. A study in agrarian discontent. By D. WILLIAMS. (Cardiff: University of Wales Press, 1955. Pp. 377. 25*s.*)

PROFESSOR WILLIAMS has already given us, in his *John Frost*, an authoritative account and interpretation of the Chartist rising and march on Newport in 1839. In that same year, six months before, in Pembrokeshire, the first toll gate was destroyed by rioters, some of whom wore women's clothes. The Rebecca Riots were contemporary with Chartism; they were the result of grievances which arose in part from the same general causes; and some active spirits took part in both movements. But Professor Williams makes it clear that they were definitely not a Chartist movement. They were a revolt of tenant farmers, not of farm labourers or industrial workers.

Professor Williams' research into contemporary accounts in newspapers, Welsh and English, national and local, into documents in the Carmarthen County Museum and the National Library of Wales, but above all in the Public Record Office, has been so thorough that his references (wisely kept separate from the main text) occupy sixty-five pages of small print. Yet his account of the events is delightfully easy to read, and the events themselves are so skilfully interpreted that we never lose sight of the wood for the trees.

Perhaps it is not quite so romantic a story as folklore would have it; but it is as lively a bit of history as any in Britain since the Young Pretender sailed back to Europe. Some years before the destruction of toll gates began, discontent found an outlet in disorders at night outside the houses of unpopular persons, such as a farmer who intended to take on another farm as well as his own. In these affairs effigies of the victim were carried on a pole or *ceffyl pren* (wooden horse). Many men in the mobs blackened their faces or wore women's clothes so as to avoid recognition. The methods of the later rioters were thus derived from ancient tradition and folk custom. It is therefore not so surprising as at first might be supposed that neither the contemporary magistrates or government agents, nor later historians, have been able to discover any master director of the series of highly successful raids, in which the military forces brought in to prevent them were again and again outwitted.

The book opens with a careful study of the system of land ownership in West Wales and of the control of political power, both in local government and in Parliamentary representation, which went with it at the opening of the nineteenth century. At the time of the Reform Bill there were differences of opinion among the gentry which gave some opportunity to radical and Nonconformist sentiment to gain expression. By 1842, however, when the major riots occurred, the great Lords Cawdor and Dynevor were in "Holy Alliance" and dominated the scene. "The growing forces of democracy had little opportunity to express themselves. The framework of government had not been altered to correspond to changes in the social structure, and the sense of frustration caused by this contributed much to the uneasiness which prevailed in the countryside." Not only did landlords exert

great influence over Parliamentary representation, parson and squire dominated town corporations and controlled the benches of magistrates which administered justice and were largely responsible for local government in the countryside. When their grievances became too heavy to bear there was no outlet for the tenantry but resort to force.

The new roads were built to provide better access to and from England, to enable lime to be brought to the farms and coal to the ports, and to link the market towns together. Clearly these are purposes beneficial to farmers; yet it was farmers who destroyed the toll gates from which came the revenue which made possible the building of the roads. Professor Williams analyses this apparent paradox with great skill.

At first, Rebecca attacked only gates which were considered "unjust": those which were placed close to others, involving double or treble charges on the same flow of traffic; or gates operated by toll-farmers who had paid for their privilege and had to recoup themselves by permitting no infringement or relaxation of the rules. There were accusations of favouritism to the gentry and distrust of magistrates who were turnpike trustees and yet acted as judges in their own cases. But none of these and other abuses would by themselves have caused the movement to have gained such wide support or to have become so extensive and violent as eventually it did.

Professor Williams shows clearly that the underlying cause was the pressure of population upon resources. He estimates that the population of Cardiganshire, Pembrokeshire and Carmarthenshire doubled itself between 1750 and 1851. Despite the enclosure and increased cultivation of uplands, there were insufficient outlets for all the would-be tenant farmers; the numbers of labourers increased; and rents rose. When a temporary depression occurred in industry, the backwash of population to the countryside made discontent well-nigh intolerable. The Rebecca Riots occurred just before the potato famine; for the situation in West Wales, though not so desperate, was very similar to that in Ireland. Fortunately for the forces of law and order, the great expansion of industry in Wales itself, in England and in the United States soon drew away the younger people of both Ireland and Wales to the mines and steelworks. Fifty years later these became in their turn the centres of social protest.

H. A. MARQUAND

London.

William Thompson, 1775–1833. By R. K. P. PANKHURST. (London: Watts, 1954. Pp. xi + 228. 15*s.*)

"Do we really deserve our democrats?" asks Mr. H. L. Beales in the foreword to this book, sadly listing the British reformers, radicals and early socialists who have never found a biographer or whose lives are interred in Ph.D. typescripts. We are beginning to deserve them. Dr. Pankhurst's lucid and admirable account of William Thompson, whom he rightly calls "the most important theoretician among the early Socialists"—the British

ones that is—joins Halévy's *Hodgskin*, which has at last been translated, the lives of Ernest Jones and William Morris, Dr. Meek's researches into the economic controversies of the first half of the nineteenth century and Professor Cole's *History of Socialist Thought*, all of them published within the past few years. It was high time. The neglect of our native group of socialist pioneers has been quite scandalous. Though none were in the highest flight as theorists, as a group and as individuals they made a most original contribution to economic and social thought and occupy a key place in the history of the international socialist and labour movement.

The specialist tends to welcome any addition to our knowledge of these men. The non-specialist will be chiefly interested in assessing their contribution to the development of the ideas and causes they had at heart and to economic theory in general. Unfortunately, since Foxwell if not from an earlier date, the discussion of the " labour economists " has been largely that of their contribution to the formation of Marxism and of the extent of Marx' debt to them. The questions are legitimate, and Dr. Pankhurst asks them, while avoiding the excess of Halévy, whose *Hodgskin* is too heavily involved for Hodgskin's safety in the controversies about Marx' originality and validity. Dr. Pankhurst gives a balanced account of the problem and therefore an open answer. He has a somewhat stronger case for his man than Halévy, for Marx had definitely read Thompson by 1846, and Thompson cannot, as Halévy seems to have thought, be regarded as " Hodgskin's disciple." Moreover, the range of Thompson's writings is far wider than Hodgskin's, and if we are looking for parallels with Marx (leaving aside the question of indebtedness) we find them not only in the field of economic analysis, but also in that of politics—Thompson was one of the rare " utopian socialists " who paid considerable attention to political activity—and in the general field of socialist ideals, about which he wrote much, being with Owen the most systematic designer of co-operative communities in our literature. However, these questions of intellectual pedigree are not very important. Most of the socialist pioneers thought along parallel lines and borrowed from one another. Marx and Engels were indebted to them in various ways, and have acknowledged their debt fairly handsomely. Further details may be safely left to the specialist.

Dr. Pankhurst gives a succinct account of Thompson's life, that of an Irish landowner which appears to have been wholly admirable and disinterested, of his practical activities, mainly in the Co-operative movement to which he rightly attaches considerable importance, and of his chief writings: the *Inquiry into the Principles of the Distribution of Wealth* (1824), the *Appeal of One Half of the Human Race, Women* (1825), *Labour Rewarded* (1827) and the *Practical Directions for the Speedy and Economical Establishment of Communities* (1830). He draws attention not merely to the ideas and theories which Thompson shared with numerous other contemporaries on the left, though they were not always expressed in the same theoretical framework, but to those which he was the first, or one of the first, to propound. *Labour Rewarded* was one of the first works to regard the trade cycle as an inevitable

concomitant of capitalism, though not arguing for any particular periodicity; the *Inquiry*, one of the first to suggest that foreign expansion was a means of preventing the lowering of the rate of interest due to the accumulation of capital at home. Thompson may also have a place in the history of debates about the national income by his insistence (as against Hodgskin) on classifying none but manual workers as "productive," since the inclusion of "*mental* labourers, *literati*, men of science" and others might open the way to capitalists and landlords claiming that they, too, were productive on the grounds of their entrepreneurial functions. He insisted strongly that economic theories—at least those of capitalist economists—were rationalisations of class interests. His chief theoretical peculiarity appears to have been a rigorous egalitarianism, for he believed that the factors on which a wage schedule would have to depend under socialism were too complex for measurement and too subject to constant change to make any but a simple egalitarian system practicable. Perhaps in this departure from what was even then an accepted view among socialists, he was moved not only by empirical considerations, but by that clear moral idealism which makes him so pleasant a man to read about. In brief, Thompson is not to be neglected as a theorist, and in so far as modern socialism still discusses its ideal society in much the same terms as those suggested by the first generation of "utopians"—and this is so even in the U.S.S.R.—he may for socialists be worth consulting for other than historical reasons.

Dr. Pankhurst attempts to assess both his theoretical and practical legacy: his established influence on J. S. Mill as well as the problem of his influence on Marx, his place in the movement for popular education, women's emancipation and birth control (he was no Malthusian, however), his influence on the trade unionist, Chartist and co-operative movements and on rationalism. But perhaps the most impressive tribute to him is the fact that even to-day "his kindness and eccentricities are still current talk among the old folk of Glandore and Rosscarbery, who learnt of him from their parents or grandparents as their friend and protector, the best of all landlords and employers." It is just that he should have a book to himself.

E. J. HOBSBAWM

Birkbeck College,
London.

The History of a Soviet Collective Farm. By F. BELOV. (New York: F. A. Praeger, for the Research Programme on the U.S.S.R., 1955. Pp. 237. $6.00.)

A CONSIDERABLE number of Western agriculturists have visited Russia during the past two years, and have had opportunities to visit both state and collective farms—probably, indeed, farms a good deal better than a random sample. The general impression is that, while technical efficiency—as judged by the yields of crops and quality of livestock—is often high, labour productivity is extremely low. Professor D. S. Hendrie, for example,

says, " it seems safe to say that farm labour productivity is not more than 25 per cent of that of the United Kingdom." This estimate makes full allowance for the very high proportion of married women in the total farm labour force. Labour efficiency appears to be considerably higher on the state farms than on the collectives, no doubt because the former has its own mechanical equipment while the collective has to rely on its machine-tractor station for mechanical cultivation, harvesting and other operations; and partly because, as the Soviet authorities continue to complain, the members of the collectives spend an inordinate amount of their time in the production and marketing of the eggs, vegetables and other produce from their minute private plots.

The author of the book was born, shortly after the revolution, in the Ukrainian village which is the scene of his narrative. The village lands extended to some 10,000 acres, and the population was some 3,000 souls. The " attack on the Kulaks " reached the village in 1928, and the process of " dekulakisation " proceeded fast. The author served in the Army, was discharged with the rank of captain in 1947 and, with reluctance, accepted the office of chairman of the collective.

He claims that, by comparison with his neighbours, he achieved a high level of output; did much to repair the devastation of the German occupation and created tolerable housing conditions and other amenities; and that he was rewarded by the emergence of something like a team spirit among his workers. But he came to be regarded by his superiors as a troublesome fellow. When he exceeded his quotas of deliveries, he was told that these had been set too low and must be raised. He was driven to resort to bribery in order to procure essential supplies and services, and suffered more and more frustration as time went on. In 1950 he was sent back to the Army; in 1951 he escaped to Western Germany and now lives in the United States.

The impression left on many readers of the book will be that the picture which Mr. Belov paints—of the gross inefficiency and corruption on the part of state officials—is altogether too bad to be true. Yet if one studies the diagrams of the Organisation of the Kolkhoz (p. 39) or that of the Organisations and Institutions in constant contact with the Kolkhoz (p. 63)—and bears in mind the probability that the higher personnel have been chosen for their political orthodoxy rather than for competence in husbandry or administration—it would not be surprising if the machinery had ground and jolted. Lower down the scale, the men most likely to have given efficient service as brigade leaders and head stockmen were probably members of the Kulak class.

The book—whether or not the picture it paints is seriously distorted—will certainly help towards a judgment of the Soviet experiment on the land.

J. A. Scott Watson

London.

NOTES AND MEMORANDA

INDUSTRIAL PRODUCTION AND PROFITS IN THE UNITED KINGDOM AND THE UNITED STATES: SOME COMMENTS

In his interesting statistical study of the relation between aggregate net profits and industrial production (this Journal, September 1955), Dr. Stern noted differences of the regression coefficients (the slope or "amplitude") and the regression constants not only for the two countries under consideration, but also for the various subperiods which he examined separately. In explaining these differences, not sufficient attention was paid: (1) to the different conditions under which production and profits changed in these periods, and (2) to the influence of the price level on these coefficients. We shall first discuss the second factor.

Dr. Stern has correlated indexes of the *physical* volume of production with indexes of the (undeflated) *money* value of the profits: it stands to reason that a rise in output by 1% would, in a period of high prices, cause a larger increase in profits than in a period of low prices. The hypothesis that money profits (y_i) are a linear function of the money value of production (in current prices) (p_iq_i) reads (disregarding in this stage the influence of price on the regression constants and of taxes):

$$(1)\quad y_i = bSp_iq_i + c$$

(where S is the summation sign and i the given year). Transforming into index form and using zero as base year:

$$(2)\quad y_i/y_o = (bSp_iq_i/y_o)\ (Sp_iq_i/Sp_iq_o) + c/y_o$$

The term in the second parenthesis is a Paasche index of production; the term in the first parenthesis is Dr. Stern's regression coefficient,[1] which is here shown to depend on p_i; the correlation between the physical volume of production and the money value of profits will be approximately equal to that between the money value of production and profits if p_i is approximately constant during the period of observation (as for 1921–23 and again for 1931–40) or highly correlated with production (as in the post-war period and in the years 1919–20). A change in the base period will affect the regression if $Sp_iq_o/Sp_iq_i \neq y_o/y_i$ (where t is the new base period).

These considerations make clear that the regression coefficients for different countries can be compared only if: (1) the base period is the same, and (2) the form and composition of the production indexes are the same.

[1] A similar result is obtained if the production index is of the Laspeyres form.

The increase of the regression coefficients during the three periods after the First World War can then be explained as follows [1]:

(1) During the twenties the increase in profits was primarily determined by the *growth* of an economy which, except for 1920, maintained a relatively constant level of utilisation—a very high one, indeed, in the U.S.A.—and which since 1921 enjoyed a relatively stable price level.

(2) The price fall in the thirties, together with a reduction in the gross profit margin,[2] could be expected to reduce the regression coefficient. This tendency was more than offset by the influence on profits of the sharp fluctuations in the degree of utilisation of capacity. Clearly short-run fluctuations in output due to changes in the degree of utilisation of a given stock of capital will affect profits more strongly than secular changes in output arising from changes in an always "fully" utilised stock of capital (positive or negative growth).

(3) The increase of the regression coefficient in the post-war period is primarily a price phenomenon (compared with the thirties prices more than doubled). In addition, the rate of growth exceeded somewhat the rate in the twenties, and profit margins probably exceeded those of the thirties, offsetting the negative influence on the regression coefficient of a constantly high degree of utilisation.

A similar discussion of the changes in the regression *constants* would be of doubtful value, since the linear relationship between profits and production cannot be supposed to hold at the zero level of production. A study of the break-even or zero profit levels is less objectionable, the less so since in the United States this point was actually reached during the second period. There is the further advantage that changes in the fixed costs due to growth and to price changes that are correlated with changes in production, will not affect the regression *constant*, but the regression *coefficient*, and hence also appear as shift of the break-even level.[3]

In the present case, the ordering of the break-even levels happens to be the same as that of the regression constants (absolute values), lowest in the twenties, higher in the thirties, highest in the post-war period.[4]

[1] We disregard the influence of tax changes which is adequately explained by Dr. Stern. Furthermore, we do not offer an explanation for the period before 1914 because we do not have one. For the three periods examined we use the correlations of series with the common base period 1935.

[2] Independent changes of the gross profit per unit of output would, of course, destroy the correlation between profits and production. It seems, however, that 1923–29 in the United States at least, the gross profit margin, if not constant, showed an upward trend, *i.e.*, was correlated with production; for 1933–39 it showed a downward trend, *i.e.*, except for 1938 it was negatively correlated with production; and that in the post-war period the margin, though higher than in the thirties, was relatively stable.

[3] Dr. Stern uses the term "shift" with reference to the regression lines, without specifying the parameters by which the shift is to be measured. He considers the British line to shift "again to the left" (p. 490 bottom) in the post-war period, though both the absolute value of the negative constant and the break-even level *increase*. True, the lowest point on the post-war line is to the left of the highest point on the line of the thirties, but the position of a curve cannot be determined by reference to one end point. For the United States all points on the post-war line lie to the right of all points on the line of the thirties.

[4] We again refrain from commenting on the period before 1914.

The very sharp increase in the break-even levels is at the first glance surprising, especially from the first to the second period. Granted a relative increase in fixed costs (in terms of constant prices) and some decline in the profit margin (see footnote 2 on p. 530), some counter-effect should have been exercised by the price fall, even if we take into account the very slow adjustment of depreciation allowances to price changes; in any case the increase in the break-even level by far exceeds the possible increase in fixed costs.

The solution of the puzzle lies in the different nature of the regression lines in the various periods. As pointed out above, the regression line of the twenties largely reflects a growing economy with a constant degree of utilisation; extrapolating this line downwards implies a reduction of capacity almost commensurate with the reduction of output; if the former were fully proportionate to the latter the break-even point would be at the zero-production level (fixed costs would have vanished), to which it is, indeed, close in the British statistics. In the thirties, on the other hand, the regression lines primarily reflect fluctuations in utilisation, and the statistical break-even point indicates zero profits for not greatly changed capacity—far to the right of the break-even points of the twenties.

This explanation, satisfactory as it is for the relation of the second to the first period, makes, of course, trouble for the increase from the second to the third period (from 25·6 index points to 71·8 in the United Kingdom, and from 80·1 to 140 in the United States). We may comfort ourselves with the observation that already the United States line for the twenties did not pass through the origin as appropriate to "pure" growth; utilisation is never completely constant and the break-even level as statistically indicated is always a mixture of short-run and secular levels. Theoretically the secular increase in profit from growth when the production level rises from x_1 to x_2 should be smaller than the short-run decline when underutilisation reduces this level from x_2 to x_1, yet the downward movement from 1948 to 1949 was, in the United States, on the same line as the upward movement from 1946 over 1947 to 1948. We had better not extrapolate too far downward.

HANS NEISSER

New School for Social Research,
New York City.

INDUSTRIAL PRODUCTION AND PROFITS IN THE UNITED KINGDOM AND THE UNITED STATES—A REJOINDER

IN his note Hans Neisser makes, *inter alia*, these points:

(*a*) the differences in the regression coefficients from sub-period to sub-period in the United States "depend" on the changes in the price level, the regression coefficients tending to be the larger, the higher the price level;

(*b*) they also depend on the degree of utilisation of capacity, the regression coefficients tending to be the smaller, the higher that degree.

He goes on to explain why from the 1920s to the 1930s the regression coefficient increased, in the latter period the fall in the degree of utilisation proving itself to be a stronger influence than the fall in the price level, and why in the post-war period at a fairly persistently high degree of utilisation of capacity the increased price level led to another increase of the regression coefficient. Unfortunately, Neisser used for these elaborations the series of correlations with the common base of 1935. It was already explained in my article that on this basis the regression coefficients in a correlation of profits to the volume of production can hardly help increasing as time goes on, because with increasing capacities absolute fixed costs (even at constant prices) increase too. This was one of the reasons for the splitting-up of the whole into several sub-periods with mid-period bases in the first part of my article. If Neisser had referred to the sub-periods with mid-period bases (graph A and B of my article), he would have been faced with the phenomenon that in the United States the regression coefficient increased from the 1920s to the 1930s, but declined from the 1930s to the post-war period, and did so decline despite the very substantial rise in the price level. And these fluctuations of the regression coefficient in the United States sample differ from the three-step rise in the United Kingdom sample, another phenomenon for which I offered some tentative, though not conclusive, explanations.

Obviously, the regression coefficient does not " depend " on the price level in the sense that the latter is the dominant influence. As a matter of fact, Neisser's equation (2) shows that the change in the price level (the ratio of p_1 to p_0) is one of several factors entering into the regression coefficient, but it cannot show the relative weight of this particular factor. As will be seen presently, its weight is probably small, unless, of course, a severe and rapid inflation deprives profit comparisons of any meaning. In the January 1956 issue of the U.S. Department of Commerce *Survey of Current Business*, Harlow D. Osborn and Joseph B. Epstein have published an article on " Corporate Profits since World War II." The data provided in this article permit us to correlate profits and the value of production for the United States, the latter represented by profits, employee compensation and net interest, called in that article " income originating." Their sample differs from that used in my article in certain respects: it includes agriculture, trade, transport and public utilities, finance, insurance, real estate, overseas activities and services, in addition to manufacturing, mining and construction; its profits are before taxation and inventory valuation adjustments, those in my sample after both; it embraces all the years 1922–55, as compared with 1919–40 and 1946–50 (53) in my sample; it includes the profits and production of all corporations, instead of an assumedly representative selection; lastly, their article gives the data for some of the years in the form of graphs, from which I have tried to reconstruct the original figures, probably not always exactly. Nevertheless, here is an opportunity to correlate profits and the value of production in the United States.

Doing so for the whole period, but excluding the war years 1941–45, I found a very close linear correlation, and a break of trend from the 1920s to the 1930s and from the latter to the post-war period. Moreover, I found regression coefficients (b) changing in the same direction as in the volume samples, if the latter are based on mid-period bases, as follows:

value sample:
$b(1922–29) = 0{\cdot}357$; $b(1930–40) = 0{\cdot}409$; $b(1946–55) = 0{\cdot}230$
volume sample:
$b(1919–29) = 2{\cdot}02$; $b(1930–40) = 4{\cdot}02$; $b(1946–50) = 2{\cdot}52$

Despite the substantial rise of the price level from the 1930s to the post-war period, the regression coefficient declined, and despite a fall in the price level from the 1920s to the 1930s, the regression coefficient increased, though by only a little in the value sample. Apparently the change in price levels is overshadowed by other factors, as, *e.g.*, by the change in the degree of utilisation of capacity. As pointed out in Part I of my article, the regression coefficient is a composite of many elements, of which changes in prices and degree of utilisation of capacity are only a selection.

Neisser's hypothesis of profits being a linear function of the value of production is borne out by the data in the value series. Such is, however, in a market economy, the effect of the never-ceasing adjustments brought about by changing prices, wages, interest rates, profit margins, inventory valuation adjustments, taxation and what else, that the volume of production, *i.e.*, growth and the degree of utilisation of capacity, emerge as the dominant factor in the fluctuations of entrepreneurial profits unless severe and rapid inflation deprives profit comparison of its meaning.

ERNEST H. STERN

London.

SEQUENCE ANALYSIS AND THE THEORY OF THE RATE OF INTEREST

IN his article in the December 1955 issue of this JOURNAL,[1] Mr. Wright begins with a set of six equations (p. 628) representing a version of the Keynesian system, with time lags introduced. The six equations are as follows, though I list them in an order different from that in which Mr. Wright presents them:

$$Y_t = E_t + K_t \qquad \text{(i)}$$
$$E_t = c_L\,(Y_{(t-1)}) \qquad \text{(ii)}$$
$$K_t = k\,(i_t) \qquad \text{(iii)}$$
$$K_t = S_t \qquad \text{(iv)}$$
$$S_t = s_L\,(Y_{(t-1)}) \qquad \text{(v)}$$
$$i_t = L_L\,(Y_{(t-1)},\ M_{(t-1)}) \qquad \text{(vi)}$$

[1] A. Ll. Wright, "Sequence Analysis and the Theory of the Rate of Interest."

Mr. Wright is worried because there are here six equations, in his view independent ones, but only five dependent variables, E_t, S_t, K_t, Y_t and i_t. The rest of his article comprises mainly a search for a sixth dependent variable, without introducing a seventh equation. Eventually he gets his extra variable by having two interest rates (the i_t and r_t on p. 634) instead of only one, but he avoids a seventh equation only by ignoring an obvious relationship between the two rates, which he himself refers to on p. 639.[1]

Before proceeding to comment on Mr. Wright's system, I would like to simplify it by consolidating his six equations into three.

The first three of his equations in my list tell the following story: the national income in any period (Y_t) is generated by consumption expenditure (E_t) plus investment expenditure (K_t), the former depending on income in the previous period, the latter on the rate of interest. Thus we could write:

$$Y_t = c_L\,(Y_{(t-1)}) + k\,(i_t) \quad . \quad . \quad . \quad . \quad . \quad (a)$$

This gives Y_t in terms of i_t.

Equation (iii), taken in conjunction with equations (iv) and (v), also tells us about the demand for, and supply of, investible funds. The demand for investible funds in any period is taken to be the same as investment in that period (and therefore depends on the rate of interest): this demand is equated to the supply of investible funds, which depends on income in the preceding period. Thus:

$$k\,(i_t) = s_L\,(Y_{(t-1)}) \quad . \quad . \quad . \quad . \quad . \quad . \quad (b)$$

This second equation, however, makes sense (as Mr. Wright would certainly agree) only if the right-hand side is interpreted as meaning something other than "the supply of savings out of last period's income," for if it were such it would always be equal to:

$$Y_{(t-1)} - c_L\,(Y_{(t-1)})$$

and the substitution of the latter expression in the right-hand side of equation (b) would give us:

$$k\,(i_t) = Y_{(t-1)} - c_L\,(Y_{(t-1)})$$

or, transposing:

$$Y_{(t-1)} = c_L\,(Y_{(t-1)}) + k(i_t)$$

i.e., the expression for *last* period's national income would be precisely the same as that given, in equation (a), for *this* period's national income.

No, we must not put an interpretation on the right-hand side of equation (b) such that we are led to the conclusion that the national income is invariable! This conclusion would, however, be avoided if we could allow $s_L\,(Y_{(t-1)})$ to take into account some flow which must be added to (or subtracted from) the flow of savings. Such an additional flow does indeed

[1] "The effect of, say, a rise in the short rate is to force individuals to sell long-term securities; the market values of these securities fall and the long rate rises; and vice versa in the case of a fall in the short rate."

exist: it is (as Mr. Wright points out) the flow of dishoarded funds (or, in the opposite sense, the flow of funds into hoards). Thus if we interpret $s_L(Y_{(t-1)})$ as Mr. Wright invites us to, the story told by equations (*a*) and (*b*), considered together, is that " this period's national income may differ from last period's on account of hoarding or dishoarding, the explanation of which is subsumed in the expression $s_L(Y_{(t-1)})$."

What, however, Mr. Wright seems not to have realised is that his remaining equation,

$$i_t = L_L(Y_{(t-1)}, M_{(t-1)}) \quad . \quad . \quad . \quad . \quad . \quad . \quad \text{(vi)}$$

is *also* a story about hoarding. For this equation is (as Mr. Wright tells us [1]) Professor Hicks' $M = L(Y, i)$ with time lags introduced (the *wrong* time lags, in my opinion [2]), and Professor Hicks' equation is in turn derived from Keynes'

$$M = M_1 + M_2 = L_1(Y) + L_2(i)$$

which is essentially a theory of hoarding.[3] Mr. Wright apparently thinks otherwise, for he alleges (p. 631) that " most Keynesians " believe that total hoarding (or dishoarding) is invariably *nil*: [4] nevertheless, it seems to me that the Keynesian equation could be translated into English in something like the following terms:

> " The amount of money hoarded at any date (M_2) depends on considerations of demand and of supply. The demand for money to hoard depends inversely on the rate of interest. The supply of money available for hoarding depends, given the total amount of money in existence (M), on the amount of money the public keeps in circulation, this amount depending in turn on the rate of income-generating expenditure that the public chooses to maintain."

If this translation be reasonably accurate, then Keynes' equation, and with it Mr. Wright's equation (vi), is essentially a story about hoarding.

Hence in Mr. Wright's system of equations the hoarding story appears twice, in two different versions. This, it seems to me, is the true reason why the system suffers from a surfeit of equations. Mr. Wright's journey in search of an additional variable turns out not to have been really necessary.

BRIAN TEW

University of Nottingham.

[1] Pp. 627–8.

[2] My interpretation (given below) of equation (vi) is that the rate of interest is affected by the supply of money available for hoarding, and that this supply comprises the *present* total amount of money in existence (M_t, not $M_{(t-1)}$), minus that portion of the total which the public intends to spend in the near future (which would serve to generate income in the future, not in the past).

[3] Keynes' equation appears in the *General Theory*, p. 199. His own symbol for the rate of interest is *r*, not *i*.

[4] What *is* invariably *nil*, given the amount of money in existence, is the net total of all changes (in any period) in the money holdings of individual members of the public. However, not all money held is money hoarded.

PRODUCTIVITY IN TWO DOMINIONS: A REJOINDER

IT is always a pleasant surprise to discover that one's old articles are being read, however critical the reader. Mr. Maddison [1] has found several flaws in mine,[2] and some of his criticisms are accepted. I remain unconvinced, however, by what I take to be his answer to my only critical reference to his earlier work.[3]

I had maintained that conceptually it was incorrect to obtain physical output figures from deflated national product (value) data, without adjusting the latter first for changes in the terms of trade. I mentioned "the appreciable effects (which) the terms of trade can have in countries in which foreign trade is as important a component of foreign trade as in New Zealand or in Canada." [4]

Mr. Maddison's answer is neither theoretically nor factually convincing. He justifies his procedure by two arguments; firstly, that "Between 1931 and 1941 the Canadian terms of trade were unchanged and over the period 1931–49 the small improvement in the terms of trade probably raised real income by under 2%, whilst real G.N.P. more than doubled." [5] His second argument is that "In New Zealand foreign trade is more important than in Canada. . . . It seems therefore quite appropriate that Mr. Lerdau should use a different technique in dealing with the New Zealand economy." [6]

For the following reasons this completely fails to persuade me:

(1) I do not know what index Mr. Maddison uses to find that the terms of trade did not change for Canada between 1931 and 1941. According to the *Statistical Yearbook of the United Nations* they did change. Import prices rose from 92 to 112, or 22%, and export prices rose from 84 to 97 or 15%. For the longer period, contrary to Mr. Maddison's assertion, *according to this index at least*, the terms of trade changed by less than over the shorter period.

(2) In 1939, according to the *Canadian Yearbook*, exports were 26% of Gross National Expenditure, and in 1946 27%. The corresponding figures for New Zealand were 26 and 22%. While it is admitted that it may be possible that the choice of different years might have changed the results slightly, the order of magnitude of these figures shows that the differences between the two dominions are not significant in this respect.

(3) Even if the New Zealand figures had been much higher, I fail to see how this would justify a different *technique* for Canada. All that

[1] A. Maddison, "Economic Growth in Two Dominions," ECONOMIC JOURNAL, December 1955.
[2] E. Lerdau, "Changing Productivity in the New Zealand Economy," ECONOMIC JOURNAL, March 1954.
[3] A. Maddison, "Productivity in an Expanding Economy," ECONOMIC JOURNAL, September 1952.
[4] *Op. cit.*, pp. 185–6. [5] *Op. cit.*, p. 717. [6] *Op. cit.*, p. 717.

Mr. Maddison is really arguing is that the size of the bias introduced in Canada by neglecting the terms of trade would be smaller. And even this is put into question, as far as the importance of foreign trade is concerned.

(4) If either of Mr. Maddison's two arguments were factually correct, the other one would be redundant. But in his original article he did not make reference to either, and unless he can adduce evidence for his present assertions, I see no reason to doubt that his original figures would have been improved by using for Canada the method with which "(Lerdau) is mistaken to suggest (Maddison) would disagree (for New Zealand)."

That my partition formula "ignores the problem of structural shifts" is admitted, and I never thought it did anything else. I *did* think that this was too evident to mention, but I may have been in error on this.

Since Bray's index is not yearly, my choice of the 1936–41 rate of growth to apply to the period 1938–43 was a counsel of expediency. Mr. Maddison is right when he says that this introduces an error. I did, however, state explicitly what I was doing.

I would like to take this opportunity to correct what is to my mind the most serious mistake of my paper, although Mr. Maddison does not mention it. I stated that "the fact that in 1947 the labour force was 20% above 1943 and the output per man hour slightly above that of 1943, while that of persons actively engaged was practically the same, makes it plausible to argue that for the economy as a whole increasing or at least constant returns to labor still exist." This was based on the incorrect unstated major premise that no appreciable net new investment had occurred in the period.

E. LERDAU

Carnegie Institute of Technology.

REJOINDER TO PROFESSOR NURKSE

ON the second page of my paper "External Economies and the Doctrine of Balanced Growth" (ECONOMIC JOURNAL, June 1955, p. 242) I mentioned that both Professor Nurkse and Professor Rosenstein-Rodan, by speaking in terms of the "inducement to invest," were implicitly assuming some elasticity in the supply of capital, and on p. 248 I stated—rather belatedly, I admit—that Rosenstein-Rodan was explicitly assuming an elastic supply of labour.

It is true that from p. 245 onwards, in my critical examination of the balanced-growth doctrine culled from the views of these authors, I treated the doctrine as not in itself entailing any particular assumption about factor supply. I regret that the reader was not reminded sufficiently often that the authors of the doctrine had in fact put it forward under more restrictive assumptions. I regret even more having confused the issue by initially (on p. 242) defining the doctrine in Nurkse's restricted form. What I do not

regret, however, is having discussed the doctrine in the unrestricted form in which "it was never put forward," as this was the most convenient way to conduct a systematic examination of the role of factor-supply conditions in determining its validity. Such an examination seemed, and seems, to me desirable because: (*a*) the vital importance of this role had not been made clear in the literature, and (*b*) different assumptions about factor supply had in fact been made by Rosenstein-Rodan and Nurkse.

In these circumstances it would not be surprising if unwary adherents of the "doctrine" should seek to apply it in conditions in which it was not properly applicable.

I question whether the bearing of factor-supply conditions on the validity of the doctrine is quite so self-obvious as Nurkse indicates. It is not, for example, "intuitively obvious," nor is it indeed the case,[1] that a technically progressive but unprofitable innovation involving an expansion of *output* in a particular industry—which is what I was arguing about—will *necessarily* involve an increased use of factors and hence, in an economy with fixed factor supply, hurt instead of helping the profitability of other industries. Still less is it obvious, or even true, that it will necessarily involve a departure from optimal allocation.

But if Nurkse is a little too hard on the doctrine of balanced growth in conditions of fixed factor supply, he is a good deal too sanguine about it on his implied assumption of elastic capital supply. Even a perfectly elastic supply of capital is *not* sufficient, nor did I grant it to be sufficient,[2] to ensure that investments in different home-market industries will tend to render each other more profitable. In particular, it may make a great deal of difference, as I pointed out, whether the capital is assumed to be raised at home or abroad.

Nurkse makes great play with my "static assumptions," but I am not clear in which respect these are thought to render my argument misleading. The main practical relevance of the balanced-growth doctrine is its bearing on the results of alternative government policies or alternative courses of entrepreneurial action. For example, what difference will it make to the real income of a country if the government (*a*) takes steps, (*b*) does not take steps, to encourage the introduction of technically efficient plants involving output expansion in a wide range of industries in circumstances in which the introduction of any such plant in any single industry would be unprofitable? Ideally, this calls for a comparative process analysis covering a period starting at the moment of decision and extending indefinitely into the future. Not only, however, would such a comparative dynamic analysis be excessively complicated, but the characteristic contribution of the "balanced-growth doctrine" to the analysis seems to relate, not to the transitional period when the supply of labour or capital is in process of expanding or of being redistributed in response to the decision referred to at (*a*) above, but to a stabler post-transitional period. Since the static character of my assump-

[1] As I pointed out (ECONOMIC JOURNAL, June 1955, p. 246, footnote 1).
[2] See ECONOMIC JOURNAL, June 1955, pp. 252–3.

tions largely consists in my ignoring this transitional period, I do not think that my conclusions are thereby invalidated.

Allyn Young, in his ECONOMIC JOURNAL article of December 1928, was discussing a somewhat different sort of question, involving a comparison, not of alternative processes relating to the same time periods, but rather of states of affairs in *different time periods*, *i.e.*, periods preceding and following significant changes in factor supply. In discussing this sort of "simple dynamic" or historical question some of my factor-supply schedule analysis may have less relevance than to the "comparative dynamic" question that I was actually discussing. This is why I treated him as a precursor rather than a proponent of the doctrine I was examining.

MARCUS FLEMING

Washington D.C.

CURRENT TOPICS

THE Annual Meeting of the Royal Economic Society was held on Wednesday, June 27, 1956. Sir Alexander Carr-Saunders was elected to the office of President in succession to Professor L. C. Robbins, who was elected Vice-President. With these exceptions the Council and Officers were elected without change for 1956–57. The formal business was followed by a discussion on "How Should We Control Monopoly?" The discussion was opened by Professor E. A. G. Robinson, Mr. J. Downie, of the Oxford University Institute of Statistics, and Professor J. L. Montrose, Dean of the Faculty of Law in the University of Belfast.

THE Secretary reported on the membership and finances as follows:

	1955.	1954.	1939.	1914.
New Fellows and Library Members elected . . .	517	367	490	50
Fellows lost by death, resignation or default . . .	482	297	496	33
Number of Fellows and Library Members on December 31	6391	6356	4572	694
Total Compounders included in above total . . .	2139	2129	1155	159
Surplus of Income over Expenditure, together with receipts from Compounders	£844	429	329	278

MR. A. T. PEACOCK, Reader in Public Finance at the London School of Economics, has been appointed to succeed Sir Alexander Gray as Professor of Political Economy in the University of Edinburgh.

We regret to report the death on June 29th of Feodora Stone, Secretary of the National Institute of Economic and Social Research and wife of Professor J. R. N. Stone of Cambridge University. We offer both to the latter and to the National Institute our sincerest sympathies.

The following have been admitted to life fellowship of the Society:

Eastwood, T. Enthoven, Dr. A. C. Stewart, M. D.

The following have been admitted to fellowship of the Society:

Allen, G. R.
Barango, A. B.
Bates, Pilot Officer M. R.
Bialieux, S.
Bo, Lt. Col. Z. K. H.
Burton, H.
Carr, J. D.
Castillo, C.
Chew, L. R.
Chiu, I. H.
Cohen, Professor J. B.
Cooper, J. R. H.
Davis, M. P.
Etoe, O. M.
Ewelukwa, D. I.
Fawzi, Professor S.
Field, A. J.
Frowen, S. F.
Graham, K.
Gupte, A. D.
Harish, D. M.
Hodson, K. G.
Jenkins, W. E.
Kejawa, A. I.
Kitchker, J. W.
Lamb, R. S.
Luther, R. F.
Ma, D. V.
Maas, W. A.
Manning, Professor J. R.
Martin, C. J.
McCarty, J. W.
McLeish, Dr. A. C.
McWhirter, D. J. L.
Merchant, H. F.
Murugamalai, R.
Nancarrow, C. J.
Obayan, E. O.
Okoroji, I. U.
Osborn, E.
Patel, J. U.
Povall, K.
Rai, K. L. B.
Ramesh, D. M.
Ramzanalli, S.
Rodwell, K.
Roy, S. K.
Ryan, J. M.
Saraiya, O. M.
Scott, A. M.
Shah, R. D.
Thakkar, K. A.
Thakkar, N. N.
The, T. S.
Velusamy, K. S.
Wilson, Mrs. E. A.
Wilson, J. B.
Wu, Fei Yang
Yang, Mrs. L. T.

The following have been admitted to Library membership of the Society:

Messrs. Hepworth & Grandage, Ltd., Bradford.
Industrial Development Bank of Turkey, Istanbul.
King's College Economics Society, Newcastle-upon-Tyne.
Mahatma Gandhi Memorial College, Udipi, S. India.
Ministerio de Industria de la Nacion, Buenos Aires.
Unione Industriale, Biellese Biella, Italy.

RECENT PERIODICALS AND NEW BOOKS

Journal of the Royal Statistical Society

VOL. 119, PART 1, 1956. *The Statistician and the Planning of Field Experiments:* D. J. FINNEY. *Causal Inference from Observational Data:* H. WOLD. *Some Aspects of the Structure of Indian Industry:* V. ANSTEY and R. J. TARAPOREVALA. *The Principles of Factor Analysis:* M. G. KENDALL and D. N. LAWLEY.

Economica

VOL. XXIII, NO. 90, MAY 1956. *Some Notes on the Estimation of Time-forms of Reactions in Interdependent Dynamic Systems:* A. W. PHILLIPS. *A Study in Price Policy:* I. F. PEARCE. *Tariffs, Balance of Payments, and the Terms of Trade:* S. A. OZGA. *The Abolition of Derating: An Exercise in Differential Incidence:* A. WILLIAMS. *The Origins of the Synthetic Alkali Industry in Britain:* T. C. BARKER, R. DICKINSON and D. W. F. HARDIE. *A Letter from David Ricardo:* L. C. ROBBINS.

Oxford Economic Papers

VOL. 8, NO. 2, JUNE 1956. *Demand and Supply Reconsidered:* G. B. RICHARDSON. *Argentina and the Baring Crisis of 1890:* A. G. FORD. *A Note on Mr. Kaldor's Trade Cycle Model:* J. BLACK. *Wages in Coal-mining since Nationalization:* K. J. W. ALEXANDER. *The Genesis of the Multiplier Theory:* A. LL. WRIGHT. *The Commercial Crisis of 1857:* J. R. T. HUGHES. *Economic Expansion and International Trade: A Geometric Approach:* W. M. CORDEN.

Bulletin of the Oxford University Institute of Statistics

VOL. 18, NO. 1, FEBRUARY 1956. *Consumer's Net Worth: the 1953 Savings Survey:* K. H. STRAW. *Gross National Product of Wales, 1950:* E. NEVIN. *Has the Distribution of Income Become More Unequal?:* D. SEERS. *A "Human Needs" Diet: Autumn 1955:* T. SCHULTZ.

The Manchester School of Economic and Social Studies

VOL. XXIV, NO. 2, MAY 1956. *Wages: Industry Rates, Workplace Rates and the Wage-drift:* H. A. TURNER. *Exports and the British Trade Cycle: 1929:* D. C. CORNER. *Patterns of Development in Newly Settled Regions:* R. E. BALDWIN. *The Element of "Accident" in the National Salary Structure:* H. R. KAHN. *Econometric Models and the Evidence of Time Series Analysis:* L. R. KLEIN.

Scottish Journal of Political Economy

VOL. III, NO. 2, JUNE 1956. *Economic Progress in Underdeveloped Areas:* T. A. F. NOBLE. *Lord Lauderdale and His "Inquiry":* A. V. COLE. *The Distinction between Wages and Salaries:* H. R. KAHN. *Economic Choice as a Philosophic Theory:* A. L. MACFIE.

Yorkshire Bulletin of Economic and Social Research

VOL. 8, NO. 1, JUNE 1956. *Wool Buying in the Nineteenth Century: A Case History:* A. BARNARD. *Monopoly, Technical Progress, and Public Policy:* J. WISEMAN. *Hansen on Keynes:* W. T. NEWLYN. *General Consistent Aggregation in Leontief Models:* M. MCMANUS. *Labour Turnover and Daily Travel to Work in the Leeds Clothing Industry:* R. HUTT.

Journal of Agricultural Economics

VOL. XII, NO. 1, JUNE 1956. *Productivity and Costs in Australia and New Zealand:* COLIN CLARK. *A Reconsideration of the Theory of Agricultural Credit:* R. H. TUCK. *Beef Supplies in the United Kingdom—Retrospect and Prospect:* R. A. MACKNESS. *The "Capital Profile" as an Aid in Decision Making in Farm Management:* A. HARRISON. *A Study of Economic Costs of Production: An Analysis of Horse and Tractor Costs:* K. DEXTER. *The Demand for Frozen Beef in the United Kingdom, 1880–1940:* R. DUNCAN. *Selected List of the Writings of Arthur W. Ashby:* J. F. DUNCAN and J. H. SMITH.

The Farm Economist

VOL. VII, NO. 5, 1956. *Production Functions for Dairy Farming and their Applications:* S. R. WRAGG and T. E. GODSELL. *The Influence of Higher Rents on Farming Systems and Methods:* J. H. SMITH. *Testing Agricultural Machinery:* R. N. DIXEY. *The Productivity of Major Factors in British Farming: II:* J. O. JONES.

Accounting Research

VOL. 7, NO. 2, APRIL 1956. *Depreciation, Cost Allocation and Investment Decisions:* H. R. ANTON. *Balance and Bottlenecks:* J. A. SCOTT. *A Financial Statement Computer:* R. H. GREGORY and T. A. MANGELSDORF. *Some Aspects of Post-war Company Finance:* A. LUBOFF. *Pioneers in English Book-keeping Texts: Hugh Oldcastle and John Mellis:* R. R. COOMBER.

British Tax Review

JUNE 1956. (This is the first issue of a new quarterly review written primarily for the practising accountant and lawyer. Copies may be obtained from Messrs. Sweet & Maxwell, 3 Chancery Lane, London, W.C.2.) *The Tax Element in Damages:* M. STEVENSON and A. ORR. *The Valuation of Stock in Trade for Income Tax Purposes:* H. C. EDEY. *Modern Methods of Minimising Taxation: I: The Deed of Covenant:* D. C. POTTER. *The Effects of the New Rating Valuation Lists:* K. F. GOODFELLOW. *The Assessment of Estate Duty: I: The Basis of Valuation:* G. H. NEWSOM. *The Budget and Finance Bill, 1956: Tax Policy and the Budget, 1956:* A. T. PEACOCK; *An Accountant's First Impressions:* J. E. TALBOT.

The Incorporated Statistician

VOL. 7, NO. 1, MAY 1956. *The Present Crisis in Statistical Theory:* L. HOGBEN. *Statistics and the Study of Prehistoric Races:* J. FEREDAY.

The Banker

VOL. 106, NO. 365, JUNE 1956. *Sterling Now. More Trade with Russia? Debate on Monetary Control: Dangers of the New Orthodoxy:* T. BALOGH. *Pensions for the Self Employed:* T. H. PEACE. *Canada Squeezes Expansion:* P. NEUFELD. *Malaya Faces Independence: II: Future of the Sterling Link:* F. H. H. KING. *Whose Cost of Living?:* D. SEERS.

VOL. 106, NO. 366, JULY 1956. *America's Seething Stability. Debate on Monetary Control: The Case for High Short Rates:* E. V. MORGAN. *Rough Weather in Lombard Street. India on the Move:* T. H. H. SKEET. *The Plan under Scrutiny:* T. BALOGH. *Why Rising Output is Inflationary:* P. EINZIG. *Monetary Restriction in Finland:* G. STJERNSCHANTZ.

The Bankers' Magazine

VOL. CLXXXI, NO. 1347, JUNE 1956. *Personal Savings and the Budget:* L. R. KLEIN. *The Finance of Local Government: Some Current Issues: I:* I. GOWAN. *Tax Relief for Pensions:* P. STEBBINGS. *Survey of Economic Conditions in the U.S.A.: Will the Recession in Motor-cars Spread? Central Bank for Central Africa:* W. T. NEWLYN.

VOL. CLXXXII, NO. 1348, JULY 1956. *The Development of National Income Statistics:* C. T. SAUNDERS. *The Essentials for Fighting Inflation:* M. J. BONN. *The Finance of Local Government: Some Current Issues, Part II:* I. GOWAN. *Insurance Accounts Analysed:* P. STEBBINGS. *Survey of Economic Conditions in the U.S.A. Savings Banking Developments in Australia:* A. T. MAXWELL.

Barclays Bank Review

VOL. XXXI, NO. 2, MAY 1956. *An Economic Survey of Western Europe. The Budget in Retrospect. The New Index of Retail Prices.*

District Bank Review

NO. 118, JUNE 1956. *Anglo-American Research Co-operation and Industrial Progress:* J. H. DUNNING. *Hire Purchase under Scrutiny:* J. D. MARVIN. *The Conquest of Inflation?*

National Provincial Bank Review

NO. 34, MAY 1956. *Financial Policy and the Competitive Power of British Industry:* S. P. CHAMBERS. *The Distribution of Industry:* J. SYKES.

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NO. 30, JUNE 1956. *The Revival of Monetary Policy in Britain:* H. G. JOHNSON. *The London Metal Exchange:* B. S. YAMEY.

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MAY 1956. *The Capital Question:* G. HUTTON. *The Future of German Democracy:* M. J. BONN. *Some Alternatives to Cash Tenancy:* A. H. MAUNDER.

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VOL. 26, NO. 10, MAY 1956. *The Bus in London, 1856–1956:* R. M. ROBBINS. *Trends in British Transport:* D. BLEE. *For and Against Monopolies in Transport:* SIR R. WILSON.

Planning

VOL. XXII, NO. 396, MAY 1956. *Secondary Modern Schools.*
VOL. XXII, NO. 397, JUNE 1956. *Performance of the Press.*
VOL. XXII, NO. 398, JUNE 1956. *Atoms in Industry: I.*
VOL. XXII, NO. 399, JUNE 1956. *Atoms in Industry: II.*

Town and Country Planning

VOL. XXIV, NO. 146, JUNE 1956. *Congested Cities and Country Towns:* F. J. OSBORN. *Europe's Disinherited Regions:* M. OSBORN. *Defects in Advertisement Control:* J. DORRINGTON. *Coventry's Central Reconstruction:* G. E. HODGKINSON and A. LING. *Gold Mines and Farm Land.*
VOL. XXIV, NO. 147, JULY 1956. *London's Efforts at Town Expansion:* E. DENINGTON. *Administration of Town Planning.*

Progress

VOL. 45, NO. 250, SPRING 1956. *The Railway as Competitive Modern Transport:* F. Q. DEN HOLLANDER. *The Duke of Edinburgh's Study Conference—A Commonwealth Experiment:* SIR M. THOMAS. *The Need for Shift Working:* SIR L. EVANS. *A Survey of World Resources: 4: The Social and Political Aspects:* SIR S. ZUCKERMAN.

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NO. 17, MARCH 1956. *The United Africa Group in East Africa.*

Cartel

VOL. 6, NO. 1, JANUARY 1956. *Restrictive Practices: The Case for an International Agreement:* S. TIMBERG. *Stronger Measures in Sweden:* L. ERONN. *Copper and the Commission:* M. TAMPLIN.

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VOL. 22, NO. 2, MAY 1956. *British Labour's Lobby, 1867–75:* H. W. MCCREADY. *Membership Participation in Policy-making in the C.C.F.:* F. C. ENGELMANN. *National Savings and Changing Employment in Canada, 1926–54:* K. MAYWALD. *Government in Contemporary Brazil:* L. LIPSON. *Concentration of Economic Power and the Economic Élite in Canada:* J. PORTER. *Exchange Stabilization in Canada, 1950–4:* H. C. EASTMAN and S. STYKOLT. *The National Housing Act, 1954:* J. V. POAPST.

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VOL. 24, NO. 1, MARCH 1956. *The Supply Curve in Keynesian Economics:* C. S. SOPER. *The Protection of the Cotton Industry in Australia and South Africa:* R. ROBSON. *The Velocity of Circulation as a Predictor:* L. M. LACHMANN; *Professor Lachmann and the Velocity of Circulation—a Rejoinder:* G. DE KOCK. *The Immigration Cycle in Palestine and Israel, 1919–1954:* E. SAMUEL. *The Accuracy of Forecasts in the South African Business Opinion Surveys:* M. VAN DEN BERG and C. VERBURGH.

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VOL. III, NO. 1, FEBRUARY 1956. *The Distribution of the National Income of India, 1950–51:* S. J. PATEL. *Employment during the Second World War:* B. N. DATAR and I. G. PATEL. *Economic Development of the American South, 1929–52:* H. W. ARNDT. *American Direct Investment in Under-developed Countries:* K. P. DALAL. *Some Aspects of Technical Progress in Small Scale Industries:* P. N. DHAR.

The Indian Economic Journal

VOL. III, NO. 4, APRIL 1956. *An Expenditure Tax:* D. T. LAKDAWALA. *I.M.F.: An Appraisal of its Work:* R. K. AMIN. *Towards a Choice among Alternative Investment Projects:* T. MANOHARAN. *Occupational Pattern in Andhra:* M. S. PRAKASA RAO. *Stability and Fiscal Policy in Underdeveloped Economies:* A. K. GHOSH.

Sankhyā

VOL. 16, PARTS 3 and 4, APRIL 1956. *Biometry:* J. B. S. HALDANE. *Is Biometry a Separate Discipline?:* H. SPURWAY. *A Problem in the Sequential Design of Experiments:* R. BELLMAN. *National Sample Survey Number Seven: Couple Fertility.*

Pakistan Economic Journal

VOL. VI, NO. 1, MARCH 1956. *Addresses at the Sixth All-Pakistan Economic Conference. Prospects of Higher Living Standard in Pakistan:* S. M. AKHTAR. *The Scope for Economic Policy:* R. H. WHITMAN. *National Planning in Pakistan:* ZAHID HUSSAIN. *Some Problems of Economic Development:* D. COCHRANE. *Methods of Using Surplus Rural Population:* T. F. WISE. *The Pattern and Magnitude of the Five Year Plan with Special Reference to the Employment Objective:* K. RAHAMAN. *Criteria for Appraisal and Selection of Irrigation Projects:* J. N. LEWIS.

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VOL. XXVIII, NO. 1, MARCH 1956. *Economic Basis of a South Australian Steel Industry:* S. B. DICKINSON. *A National Wages Policy:* B. CAMERON. *Imperial Preference—Foreign Attitudes:* W. R. CARNEY.

The East African Economics Review

VOL. 2, NO. 2, JANUARY 1956. *Development: Economic and Political Planning in Kenya:* E. A. VASEY. *East Africa Royal Commission 1953–55 Report: A Symposium.*

International Labour Review

VOL. LXXIII, NO. 4, APRIL 1956. *The Organisation of Employment Services in Economically Underdeveloped Countries. Co-operation in Social Affairs between the Northern Countries of Europe:* K. SALVESEN. *The Finnish Labour Force:* E. ELFVENGREN.

VOL. LXXIII, NO. 5, MAY 1956. *Labour Problems of Rationalisation: The Experience of India:* C. A. MYERS. *Freedom of Association and Industrial Relations in Latin America: I:* R. VERNENGO. *Improving Labour–Management Co-operation: A Proposed Programme of Action for the International Labour Office:* D. L. COLE.

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VOL. IX, NO. 5, MAY 1956. Usual Statistical Material.
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VOL. VIII, NO. 4. *Saving and Insurances:* V. GAVRIYSKI. *An Analysis of Labour Intensity on Collective Farms:* S. STANEV and T. TOTEV. *Ways to Lower Production Costs in the Canning Industry:* V. RANKOV. *The Accounting of Packing in Trade:* D. SPASOV. *Foreign Investment in Bulgaria:* A. ALEKSIEV. *The Chinese People's Republic in the Ascendant:* S. SLAVEV.

Kozgazdásagi Szemie (Hungarian text, English and Russian summaries)

No. 4, 1956. *Lenin on the Law of the Preferential Development of Producers' Goods:* P. ERDŐS. *Some Problems Connected with the Continuous Increase of Labour Productivity in the Soviet Sixth Five-year Plan:* J. SZABÓ. *The Application of Lenin's Principle of Incentives:* I. BENKE. *Methodological Problems of Costing and Profitability in Producers' Co-operatives. The Improv-*

ment of Planning and Costing on State Farms: S. KAPÁTSY. *Benjamin Franklin's Economic Theories:* A. MÁTYÁS. *A Year's Work in the Institute of Economics. The Scientific Conference Held by the Institute of Economics of the German Academy of Sciences:* I. HALÁSZ. *Economic Problems of Western Germany:* J. KORNAI. *Achievements and Shortcomings of the Quality Standard Wage System in Metallurgy:* G. ENGEL and I. SZILÁGYI. *The Way to Solve the World's Energy Problem—the Peaceful Use of Atomic Energy:* T. KEPES.

Statisztikai Szemle (Hungarian text, English and Russian summaries)

MARCH 1956. *The XX Congress of the Communist Party of the Soviet Union. The Execution of the June 1955 Party Decision (on Agriculture):* J. MOHOS. *The Trend of Coal Production Costs in 1955:* A. RADÓ. *The Trend of Marriage Rates in Hungary:* A. KLINGER and E. SZABADY. *Refined Statistical Methods of Road Traffic Conditions:* T. MURÁNYI.

APRIL 1956. *The XX Congress of the Communist Party of the Soviet Union and Some Tasks for Statisticians:* A. MÓD. *The Preparation and the Economic and Technical Planning of Investments:* F. DEÁK. *Household Plots on Co-operative Farms:* J. FARKAS. *The Bourgeois Computation of the National Income in Hungary:* R. HORVÁTH. *A Comment:* I. HETÉNYI.

Probleme Economice (Rumanian text, French and Russian summaries)

No. 2, 1956. *For the Construction of a Unified Socialist Economy. The Problems of Introducing New Technology into Engineering:* A. IVANCENKO. *Economize Metals Better during the Second Five-year Plan:* R. MICLEA and L. APA. *Labour Productivity in Collective Farms:* V. TOPOR and E. JOIŢA. *The Ploughing of Virgin Lands—an Important Potential for Grain Growing in the U.S.S.R.:* S. DOVARI. *The Economic Ideas of M. Kogălniceanu:* V. IONESCU.

No. 3, 1956. *The Spreading of Advanced Experience in Industry. Some Problems in the National Income of Rumania:* A. ROSEN. *Problems of the Socialist Electrification of Rumania:* V. ŞANDRU. *The Development of the Chemicals Industry in the First Five-year Plan:* A. GLÜCK. *The Importance of Anti-erosion Measures for the Expansion of Agricultural Output:* M. MOTOC. *The Progress of Chinese Agriculture through Collectivization:* P. ANTIM. *Prospects for East–West Trade and the Normalization of International Relations:* S. VERONA. *Conclusions of the Conference on the Methodology of Computing Industrial Labour Productivity.*

No. 4, 1956. *The Increase of Labour Productivity—a Key Factor in the Realization of the Second Five-year Plan. V. I. Lenin on Labour Productivity under Socialism:* D. MARIN. *Some Aspects of the Correlation between Productivity Increments and Wages:* E. BALAŞ. *Some Problems of Piece-rate Fixing in Rumania:* P. COPPELOVICI. *The Role of Advanced Technology in Raising Productivity in Engineering:* H. STERIAN. *The Effect of Reducing Time Spent on Ancillary and Servicing Operations in Raising Productivity in the Clothing Industry:* S. TEICH. *A New Stage in the Socialist Transformation of Industry and Commerce in the Chinese People's Republic:* SIUI DI SIN. *The Problem of National Differences in the Correlation of Salaries, Productivity, the Structure of Capital and the Rate of Profit in the History of Capitalism:* J. KUCZINSKI. *The Economic Development of India:* F. DUCA. *Over-production Crises:* Z. BRÎNCU.

NEW BOOKS

British

BEER (S. H.). Treasury Control. The co-ordination of financial and economic policy in Great Britain. London: Oxford University Press, 1956. 7½″. Pp. v + 138. 15*s*.

[To be reviewed.]

BELLERBY (J. R.) and Others. Agriculture and Industry, Relative Income. London: Macmillan, 1956. 9″. Pp. 369. 30*s*.

[To be reviewed.]

BUCKLEY (K.). Capital Formation in Canada, 1896–1930. Canadian Studies in Economics, No. 2. Toronto: University of Toronto Press (London: Geoffrey Cumberlege), 1955. 10″. Pp. 163. 26*s*.

[The main purpose of this substantial piece of research is to present statistical estimates of different classes of investment in Canada during the period stated, thereby linking up with the official figures which begin in 1926. The book also contains a fairly detailed historical survey and

analysis of the course of capital formation as revealed by the statistics. The central thesis underlying this survey is that the production of wheat on the Canadian prairie was the main dynamic force in the economy and was ultimately responsible for the investment induced in other sectors, notwithstanding that this investment much exceeded in amount that carried out at the agricultural frontier itself.]

BUTLIN (N. G.) and DE MEEL (H.). Public Capital Formation in Australia. Estimates 1860–1900. Australian National University Social Science Monographs, No. 2. Canberra: Department of Economics, Australian National University, 1954. 10″. Pp. 226.

BUTLIN (N. G.). Private Capital Formation in Australia. Estimates 1861–1900. Australian National University Social Science Monographs, No. 5. Canberra: Department of Economics, Australian National University, 1955. 10″. Pp. 166.

[These two monographs contain part of the statistical material being collected for an investigation into the relation between capital formation and economic change in Australia since 1860. Data are given by type of investment and by state, and an attempt is made throughout to give measures of investment in both gross and net terms. The amount of statistical information available turns out to be surprisingly extensive. Little work has previously been done in this field, so Mr. Butlin and his collaborators have made an important addition to knowledge. Full documentation is included on concepts, methods and sources. Analysis of results is postponed to later publications, but a brief discussion of some of the issues raised by the figures is included in the volume on Private Capital Formation. The three leading classes of investment, in order of importance, are found to be residential construction, pastoral and agricultural investment, and railway construction. Public investment and private investment were of roughly the same order of magnitude, and curiously enough had a certain tendency to move inversely to each other in the short period. Mr. Butlin suggests possible explanations for this. In the longer period private and public investment both follow the same broad pattern: absence of growth in the 1860s, rapid increase in the 1870s and 1880s, and then steep decline into the great Australian depression of the 1890s.]

COLE (M.). Servant of the County. London: Dennis Dobson, 1956. 9″. Pp. 200. 15*s*.

[This is a book about the work of the L.C.C. as it appears to an individual member of the council. Mrs. Cole has not set out to write a systematic text-book on local government or the government of London. She has endeavoured rather to give the "feel" of local government work, particularly in the educational field, in a way that the text-books cannot do. In this she has succeeded admirably, though some readers would perhaps have been helped by a more explicit treatment of the scope and limitations of the Council's authority. The best parts of the book are those describing the relations, formal and informal, between the various groups of people engaged in the work of local governments: the councillors, the chairmen of committees and sub-committees, the officers and other paid staff, the voluntary assistants, and the members of the general public. The book is notably well written, in a style that contrives to be informal without being slipshod.]

Cost Reduction. London: Institute of Cost and Works Accountants, 1956. (Distributed by Gee & Co., 27 Basinghall Street, London, E.C.2.) 9½″. Pp. 49. 6*s*.

[This summarises findings of research which has been organised by the Institute of Cost and Works Accountants over the last few years. After an introductory chapter on ways of planning a programme of cost reduction, the report analyses means of reducing costs under four headings, design of the product, factory organisation and methods, marketing, and finance. The authors suggest that the greatest scope for cost reduction is probably in the sphere of product design, since cost at all stages is affected by decisions made on this point.]

CROOME (H.). Introduction to Money. London: Methuen, 1956. 7½″. Pp. vii + 209. 10*s*. 6*d*.

[To be reviewed.]

DEGRAS (J.) (Ed.). The Communist International, 1919–1943, Documents. Volume I, 1919–1922. London: Oxford University Press for the Royal Institute of International Affairs, 1956. 10″. Pp. 463. 55*s*.

[The period covered by this volume ends with the last world congress of the Communist International that was attended by Lenin. This congress was also, as Mrs. Degras explains, the last one at which discussion was fairly uninhibited. The documents given include most of the general programmatic and theoretical statements of the Communist International, together with a smaller selection of statements on current events, letters to and resolutions on national communist parties, and documents relating to the internal organisation of the Communist International. The editor provides introductory comments on each of the documents quoted so as to place them in their context and relate them to other statements made by communist leaders on the subjects in question.]

FAY (C. R.). Adam Smith and the Scotland of his Day. Department of Social and Economic Research, Glasgow University, Social and Economic Studies, III. London: Cambridge University Press, 1956. 9″. Pp. 174. 25*s*.

[To be reviewed.]

GALLETTI (R.), BALDWIN (K. D. S.) and DINA (I. O.). Nigerian Cocoa Farmers. An economic survey of Yoruba cocoa farming families. London: Oxford University Press for the Nigeria Cocoa Marketing Board, 1956. 9½″. Pp. v + 744. 105*s*.

[To be reviewed.]

HANSON (A. H.). Financing Local Government. Fabian Research Series, No. 178. London: Fabian Society, 1956. 8½″. Pp. 37. 2*s*. 6*d*.

[The author describes the ways in which local government in this country is financed at present and suggests various reforms. The most fundamental reform required in his view is to broaden the basis of local taxation. The abolition of de-rating would contribute to this, but serious consideration should also be given to the possibility of forms of local taxation other than rates. Britain is almost alone in Western Europe in relying entirely for local revenue on taxes on real estate. Mr. Hanson also proposes certain changes in the method of administering grants-in-aid. He suggests finally that the Labour Party should incorporate again in its election programme a Local Authorities Enabling Act, to permit local authorities to carry on a wide range of business activities if they wish to without having to obtain a private Act of Parliament. This was proposed originally in 1927, but has since been dropped from the Labour Party's programme.]

HICKS (J. R.). A Revision of Demand Theory. London: Oxford University Press, 1956. 7½″. Pp. 196. 18*s*.

[To be reviewed.]

JAQUES (E.). Measurement of Responsibility. A study of work, payment and individual capacity. London: Tavistock Publications, 1956. 9″. Pp. ix + 143. 15*s*.

[To be reviewed.]

DE KOCK (G.). A History of the South African Reserve Bank, 1920–52. Pretoria: J. L. Van Schaik, 1954. 9″. Pp. vii + 376. 32*s*. 6*d*.

[This is not an official history of the South African Reserve Bank, but the author, whose father is the present Governor of the Bank, has been furnished by the Bank with unpublished documents and information to assist him in his researches. The Bank was set up by the Currency and Banking Act of 1920, and Dr. Kock traces its history chronologically from then up till the present day. Three main topics run through the study: the gradual extension of the Bank's statutory powers; its gold and exchange policies and operations; and its credit policy. Treatment of these topics naturally involves the author in a good deal of more general discussion of the monetary and other economic problems of the Union.]

KOSMINSKY (E. A.). Studies in the Agrarian History of England in the Thirteenth Century. Edited by R. H. HILTON and translated from the Russian by R. KISCH. Oxford: Basil Blackwell, 1956. 9″. Pp. v + 370. 37*s*. 6*d*.

[To be reviewed.]

LASLETT (P.) (Ed.). Philosophy, Politics and Society. Oxford: Basil Blackwell, 1956. 9″. Pp. vii + 184. 18*s*.

[To be reviewed.]

MAIN (O. W.). The Canadian Nickel Industry. A study in market control and public policy. Canadian Studies in Economics, No. 4. Toronto: University of Toronto Press, 1955 (London: Geoffrey Cumberlege, 1956). 10″. Pp. 168. 26*s*.

[This monograph traces the development of the Canadian nickel industry chronologically since its beginnings in the 1880s. The author disclaims any intention to write a general history of the industry, however, and his purpose is rather to provide a case-study in entrepreneurial behaviour. Canadian nickel has always been substantially a monopoly, and the problems of establishing and maintaining this position occupy a central place in the story. Because of continuing threats of competition from outside, pressure of public opinion and fluctuations in demand the industry has not been able to enjoy freedom from anxiety, and in the face of such challenges monopolistic control has not prevented rapid expansion in the industry and may well have fostered it.]

MEEK (R. L.). Studies in the Labour Theory of Value. London: Lawrence & Wishart, 1956. 9″. Pp. 310. 30*s*.

[To be reviewed.]

Monetary and Fiscal Policy in New Zealand. Submissions to the Royal Commission on Monetary, Banking and Credit Systems 1955 by the Reserve Bank of New Zealand, Associated Banks in New Zealand and the New Zealand Treasury. Wellington: Reserve Bank of New Zealand, 1955. 9″. Pp. 252.

[The contents of this book first appeared as statements to a Royal Commission on Monetary, Credit and Banking Systems, which sat in 1955. There are several statements from the Reserve Bank of New Zealand and from the Treasury, and one from the Associated Banks of New Zealand. The subjects discussed include the structure of New Zealand's monetary system, recent economic developments and their relation to fiscal and monetary policy, and New Zealand's position *vis-à-vis* the International Monetary Fund and the International Bank. Taken together, these statements provide a fairly comprehensive treatment of New Zealand's monetary institutions as well as a presentation of official views about monetary problems and policies.]

National Institute of Economic and Social Research. Classified List of Large Companies Engaged in British Industry. London: National Institute of Economic and Social Research (2 Dean Trench Street, Smith Square, S.W.1), 1955. 11″. Pp. 39. 5*s*.

[This useful work of reference has been compiled as a by-product of an inquiry into the sources and uses of funds of public companies. The list gives net assets and incomes in 1953/54 and 1954/55 of all British public companies, whose net assets in 1953/54 exceeded £2·5 million, excluding companies operating primarily overseas and certain other classes of companies. The companies given are classified by asset size and by industry, and there is also an alphabetical index.]

Perry (J. H.). Taxes, Tariffs, and Subsidies. A history of Canadian fiscal development. In two volumes. Toronto: Toronto University Press (London: Geoffrey Cumberlege), 1955. 9½″. Vol. I: pp. 324; Vol. II: pp. 435. 200*s*.

[The chief aim of the author has been to provide a really comprehensive survey of the way in which fiscal arrangements in Canada have developed. It is primarily a factual and descriptive study, and the author explains that less interpretation has been included than was orginally intended, so as to make room for a fuller record of the facts. One of the main issues in the field of public finance in Canada has been the proper financial relations between the federal government and the provinces, and Mr. Perry devotes much attention to explaining the present arrangements and their antecedents.]

Robinson (Joan). The Accumulation of Capital. London: Macmillan, 1956. 9″. Pp. v + 440. 28*s*.

[To be reviewed.]

Scott (K. J.) (Ed.). Welfare in New Zealand. Studies in Public Administration, No. 3. Wellington: New Zealand Institute of Public Administration 1955 (London: Geoffrey Cumberlege 1956). 9″. Pp. 130. 16*s*.

[The six papers contained in this volume were first delivered at the Convention of the New Zealand Institute of Public Administration in May 1955. Three of them are concerned with administrative problems of the social services, while the others discuss the development of the social services, particularly in New Zealand, in relation to more general trends in economic structure and political thought.]

Stone (L.). An Elizabethan: Sir Horatio Palavicino. London: Oxford University Press, 1956. 9″. Pp. 345. 45*s*.

[To be reviewed.]

Wallace (C.). How to Retire Successfully. London: Evans, 1956. 8″. Pp. 160. 10*s*. 6*d*.

[This book covers every aspect of retirement from the finance of one's old age to the problems of occupation, of health and of where to live.]

Wheatcroft (S.). The Economics of European Air Transport. Manchester: Manchester University Press, 1956. 9″. Pp. v + 358. 35*s*.

[To be reviewed.]

Wijnholds (H. W. J.). International Trade and Payments. An introduction to the theory of international trade, commercial policy and other international economic relations. Pretoria: The Academic Press, 1955. 9″. Pp. 181.

[This is designed as a short introduction to international trade, preparing the student for the reading of more elaborate works on the subject. Its two parts deal respectively with Theory and Commercial Policy. It is very clearly written, and some parts of the ground are covered

extremely well in the short space available—for example, the question of what actually maintained equilibrium in the balance of payments under the gold standard in the nineteenth century. However, both the choice of topics for inclusion and the treatment of them at some points have rather an old-fashioned ring, and this prevents the book from being an entirely satisfactory introduction for the student who wishes to get to grips with present-day problems. Examples of important topics which receive little or no attention are elasticities of demand and supply in foreign trade and the effects on the terms of trade of alternative means of correcting an adverse balance of payments.]

WILLAN (T. S.). The Early History of the Russia Company, 1553–1603. Manchester: Manchester University Press, 1956. 9″. Pp. 295. 30*s*.

[To be reviewed.]

WILLEY (F. T.). Plan for Shipbuilding. Fabian Tract 299. London: Fabian Society, 1956. 8½″. Pp. 24. 1*s*. 6*d*.

[The author briefly surveys the experience of the shipbuilding industry between the wars and since 1945. He presents evidence for the view that as a combined result of the great additions to tonnage made in recent years and of the growth of foreign competition, especially from Germany, some contraction in British production is probable in a few years time. He suggests that despite the rather disappointing history of development councils in other industries, the formation of such a council for shipbuilding might help both to increase efficiency and to facilitate the process of adjustment if contraction does turn out to be unavoidable.]

Indian

DATTA GUPTA (A. K.). State Financing of Private Enterprise in Post-war India. Calcutta: Modern Book Agency, 1955. 9″. Pp. 188. Rs. 9/-.

[After three introductory chapters on the general problems of finance of industry in India, the author surveys in turn the various ways in which the state has assisted in the finance of industry since the War. He welcomes the extension of the scope of this assistance in recent times. But he believes that it is still not nearly adequate, and he suggests, moreover, that there has been a lack of co-ordination between and even within the various agencies and systems involved.]

GADGIL (D. R.) and DANDEKAR (V. M.). Primary Education in Satara District. Reports of two investigations. Gokhale Institute of Politics and Economics, Publication No. 32. Poona: Gokhale Institute of Politics and Economics, 1955. 9½″. Pp. 172. Rs. 6/-.

[This contains two separate papers on related subjects. "Report of Investigation into the Problem of Lapse into Illiteracy in the Satara District," by D. R. Gadgil, analyses the causes and extent of such lapse, and finds that while the quality of the school attended seems to make little difference, much greater significance attaches to the length of stay at school and to the opportunities to make use of literacy in the years immediately after leaving school. The other paper is "Report of Investigation into Wastage and Stagnation in Primary Education in the Satara district," by V. M. Dandekar. The term "wastage" refers to pupils who leave school prematurely and "stagnation" to those who fail to make normal progress at school.]

MARK (J.). The Modern Idolatry, being an analysis of usury and the pathology of debt. Bombay: Libertarian Social Institute (Ayra Bhuvan, Sandhurst Road, Bombay 4). 9″. Pp. 230. Rs. 12/-.

[This is an attack on modern financial and monetary institutions, based on the doctrines that interest is immoral and the only obstacle to a world of plenty, and that the structure of credit as it exists is fictitious and illusory. No date of publication is given, but the book appears to have been written before the War.]

SAPRE (N. B.). The Technique of Planning in India. Poona: published by the author (855 Shivajinagar, Poona 4), 1955. 8½″. Pp. 171. Rs. 3/8.

[Mr. Sapre complains of the lack of an adequate literature of the techniques of economic planning and sets out to fill the gap, always with the needs and methods of India rather particularly in mind. He begins with the assumptions and the form of planning, and the establishment of a central organisation. He then proceeds to the laying down of objectives, the determination of priorities, and the assumptions and estimates that must lie behind them. Mr. Sapre stresses hardly sufficiently the importance of adequate and really competent national-income forecasts; he states, for example, the assumed growth of 11–12% in national income in India between 1948–49 and 1955–56, but he does not discuss how far this figure was realistic and what assumptions it made, or should have made, about progress with the reduction of unemployment. Equally he does not make it clear what is the relation of the determination of priorities to forecasts of the expenditure of income; unless one can enforce priorities one must take account of the priorities likely to be set by the market. From

these questions Mr. Sapre goes on to more comprehensive planning, to dynamic considerations, to the discussion of the plan and to certain final conclusions about techniques of planning. This book raises questions of great interest and importance. It may be wondered whether Mr. Sapre, despite his continuing emphasis on the differences of techniques in different countries, quite sufficiently stresses the intimate relation between the techniques of planning and the more basic decisions as to one's readiness or lack of readiness to use certain powerful weapons of rationing and control to limit and direct personal consumption and to enforce personal saving.]

SINGH (BALJIT). A Report on Unemployment in the City of Lucknow. Lucknow: Lucknow University, 1955. 10″. Pp. 151.

[A roneo-ed study of unemployment in Lucknow, its dimensions, period and causes, based on a sample survey. The average period of unemployment of those previously employed in industry was found to be as high as 24·09 months, and unemployment of new entrants had an average period of 23·34 months. While the causes of unemployment are analysed under the normal heads of new entrants (36% of all unemployment), retrenchment (over 10%), dismissals (10%), illness (9%), slump (6½%), premature retirement (5½%), with resignation and migration accounting for still smaller proportions, it seems clear that lack of effective demand to absorb the unemployed is a contributory factor in keeping the proportion of unemployment as high as it was: over 10% of the sample investigated.]

American

BEAL (G. M.) and BAKKEN (H. H.). Fluid Milk Marketing. Madison, Wisconsin: Mimir, 1956. 9½″. Pp. 556. $7.50.

[This is designed as a text-book on dairy marketing in the United States. It describes present methods of transporting, distributing and processing milk. Much attention is given to alternative methods of milk pricing that have been or might be adopted.]

BECKMAN (M.), MCGUIRE (C. B.) and WINSTEN (C. B.). Studies in the Economics of Transportation. New Haven, Conn.: Yale University Press for the Cowles Commission for Research in Economics (London: Geoffrey Cumberlege), 1956. 9½″. Pp. xi + 232. 32*s*.

[To be reviewed.]

Capital Formation and Economic Growth. A Conference of the Universities-National Bureau Committee for Economic Research. Princeton, New Jersey: Princeton University Press for the National Bureau of Economic Research, 1955 (London: Geoffrey Cumberlege, 1956). 9½″. Pp. 677. 96*s*.

[To be reviewed.]

CARLSON (A. S.) (Ed.). Economic Geography of Industrial Materials. New York: Reinhold Publishing Corporation (London: Chapman & Hall), 1956. 10½″. Pp. 494. 100*s*.

[This is a reference book in which methods and location of production of the chief industrial materials are described by experts in the fields in question. The coverage is worldwide, but heavy emphasis is placed on the United States.]

CREAMER (D.). Personal Income During Business Cycles. Princeton, New Jersey: Princeton University Press for the National Bureau of Economic Research (London: Geoffrey Cumberlege), 1956. 9½″. Pp. ix + 166. 32*s*.

[The greater part of this monograph comprises an analysis of the relative timing and amplitude of cyclical fluctuations in different classes of personal income in the United States since 1909. Income is taken before tax but including transfer payments. The incomes of independent proprietors are found to fluctuate more than wages and salaries, and wages and salaries fluctuate more than income from property. The cyclical behaviour of subdivisions of these three main classes of income is also analysed in a good deal of detail. Certain conclusions follow about the cyclical movements of relative shares. These conclusions relate to shares in total personal income, not the more commonly discussed shares in national income, and they are for that reason sometimes rather unexpected—for example the conclusion that the share of property income varies inversely with the level of business activity. Further chapters deal with cyclical movements in the size-group distribution of income and with the quantitative significance of built-in stabilisers of personal income provided by federal government policies. There is also an interesting introductory chapter on long-term shifts in distribution. The share of labour income in total personal income is shown to have risen substantially, at the expense both of income accruing to independent proprietors and of income from property, especially rent.]

DAVIES (M. G.). The Enforcement of English Apprenticeship, 1563–1642. A study in applied mercantilism. Harvard Economic Studies, Vol. XCVII. Cambridge, Mass.: Harvard University Press (London: Geoffrey Cumberlege), 1956. 8½". Pp. v + 319. 48*s*.

[This monograph is based on extensive research in the records of court proceedings. It is divided into two parts: enforcement by private interests (informers), and enforcement by public agencies. Of these the first is found to have been very much the more effective. The author analyses the ways in which this reliance on private interests for enforcement of the apprenticeship requirements laid down by the Statute of 1563 affected the working of the Act and hence influenced the development of industry and trade in Elizabethan and Stuart England. Some valuable incidental sidelights on the structure of the economy in the period are cast by the extensive detail which the author furnishes on the regional and chronological distribution of prosecutions. One of the most interesting conclusions is that the law relating to apprenticeship was more actively enforced in times of depression than in times of good trade, presumably because the incentive to restrict competition was stronger when trade was depressed.]

DERBER (M.). Labor–Management Relations at the Plant Level under Industry-wide Bargaining. A study of the engineering (metal-working) industry in Birmingham, England. Champaign, Illinois: University of Illinois Institute of Labor and Industrial Relations, 1956. 9½". Pp. 130. $2.50.

[The question whether collective bargaining is best conducted on an industry-wide basis or at a lower level has been the subject of much controversy in the United States. The present study of certain aspects of this question is based on material collected by Mr. Derber during a six-months stay in England. He begins with a fairly extended treatment of the national framework of collective bargaining in the engineering industry in this country, and then proceeds to analyse the working of the system at the local level in Birmingham. He finds that the commonly-stated aim of industry-wide bargaining, to "take labour out of competition," was not by any means fully achieved; for although certain important conditions of employment, such as the length of the basic working week, were standardised between firms, the same was not true of wage-rates. This is chiefly because the rates set by national agreements are no more than minima and are usually exceeded. Mr. Derber also gives a good deal of attention to the degree of local discretion which the system allows to representatives of workers and employers. He found very general agreement on both sides that the present system of industry-wide bargaining on major issues is better than a system of plant-by-plant bargaining would be. In relating his findings to the corresponding problems in America, the author concludes that industry-wide bargaining is not nearly so inflexible as is commonly alleged. He emphasises also the importance of separating clearly the different aspects of the question that have often been confused in the American discussions.]

DUE (J. F.). Intermediate Economic Analysis. Third Edition. Homewood, Illinois: Richard D. Irwin, 1956. 9½". Pp. 588. $7.20.

[The first edition was published in 1947. The book aims to provide a treatment of economic theory "at a level intermediate between the beginning principles courses and graduate courses in economic theory." The stress is on value and distribution, and this branch of theory is dealt with fairly rigorously. Macro-economics is much more briefly treated.]

EINAUDI (M.), BYÉ (M.) and ROSSI (E.). Nationalization in France and Italy. Ithaca, New York: Cornell University Press (London: Geoffrey Cumberlege), 1955. 9". Pp. 260. 28*s*.

[This consists of three separate essays, by Maurice Byé on Nationalisation in France, by Ernesto Rossi on Nationalisation in Italy, and A Comparative Study of Nationalisation Policies, by Mario Einaudi. The origins of nationalisation were very different in the two countries. In Italy, state ownership of industry arose chiefly from public agencies taking over the assets of distressed banks, especially in the depression of the 1930s. In France, on the other hand, the main nationalisation measures were taken in the period of left-wing enthusiasm after the liberation. These differences in origin are reflected in the many differences between the nationalised sectors in the two countries as they have subsequently evolved.]

EISNER (R.). Determinants of Capital Expenditures. An interview study. Bureau of Economic and Business Research, University of Illinois, Studies in Business Expectations and Planning, No. 2. Urbana, Illinois: University of Illinois, 1956. 9". Pp. 100. $1.50.

[This is based on extensive interviews conducted by the author with the officers of fourteen large manufacturing firms. Professor Eisner recognises that the interpretation of interview data is bound to contain a large subjective element, so in addition to analysing the findings in overall terms he also reproduces at some length the information he received from the individual businesses. Many interesting and suggestive points emerge from what he says. Expansion of demand for the firms' products was found to be a paramount consideration in planning capital expenditures, thus broadly confirming the acceleration principle. But a good deal of stress was also laid in the

interviews on the need to be sure that the increase in demand was not of a merely transitory character. Financial considerations tended in general to be played down, but the interpretation of this is more than usually subject to the difficulties inherent in the interview method—difficulties which Professor Eisner discusses in a very penetrating fashion in an introductory chapter. The various cost and earnings criteria applied by the firms to contemplated capital expenditures proved rather elusive and in some cases even internally inconsistent. Professor Eisner gives an algebraical analysis of the biases inherent in some of them. But in any case these criteria appear as a rule to be used chiefly as minimum requirements that have to satisfied in order to qualify a project for consideration, the ultimate decision being based on broader and less exactly formulated grounds. Other points discussed include the treatment of replacement investment, the machinery for arriving at investment decisions, the influence of taxation, flexibility and time-lags in planning and carrying out investment, and the accuracy of firms' estimates of their own future capital expenditures.]

FOSSATI (E.). Essays in Dynamics and Econometrics. Chapel Hill, North Carolina: School of Business Administration, University of North Carolina, 1955. 9″. Pp. 36.

[This contains three lectures delivered at the University of North Carolina. The first lecture, "From Statics to Dynamics," is on the methodology of economic theory and recapitulates certain views put forward by Professor Fossati twenty years ago. The second lecture is entitled "Vilfredo Pareto and John Maynard Keynes, One Economic System or Two?" In the third lecture, "Some Remarks about the Real Meaning of Econometric Inquiries from the point of view of an Economist," Professor Fossati pleads for a clearer distinction to be drawn between the methodological or purely theoretical branch of econometrics and its application.]

GALBRAITH (J. K.) and HOLTON (R. H.). Marketing Efficiency in Puerto Rico. Cambridge, Mass.: Harvard University Press, 1955 (London: Geoffrey Cumberlege, 1956). 9½″. Pp. 204. 36*s*.

[This contains a very comprehensive survey of present retailing and wholesaling practices in Puerto Rico and an assessment of the scope for possible reductions in cost in this field. The book falls into four main parts: a description of the retailing and wholesaling of food in Puerto Rico at present; a comparison of this with a hypothetical model system of food distribution; a description of the marketing of non-food products; and finally, a set of recommendations. Distribution is more important in Puerto Rico than in most backward countries, because the island's economy is based on exporting, and a very large proportion of the food consumed is imported. The main characteristics of the system of distribution are fairly easily understood, and stem from the general economic conditions in the island, especially the chronic labour surplus: numerous very small enterprises (particularly in food retailing) with small turnover and high margins, a heavy reliance on credit at all stages of the chain of distribution, and a "live and let live" attitude among traders, whose ambitions to expand their businesses are usually very limited and who regard as unethical any active attempts to increase their share of total sales by price competition. The amount of labour employed in distribution is obviously much greater than it needs to be, and the high costs of the system are reflected in the prices paid by consumers. But any proposals for increasing efficiency come up against the basic difficulty that so long as a general surplus of labour persists, a reduction in the amount of labour employed in distribution is unlikely to bring about much increase in total production and real income in the island. As the authors put it, the excessive absorption of labour in distribution serves some of the functions of a system of unemployment relief; if a reduction in the man-power engaged in distribution led to a corresponding increase in unemployment, the result would be, at best, merely to shift the burden of supporting these people from consumers to some other possibly better source of finance. Having made this point in their first chapter, the authors appear rather to lose sight of it in the rest of the book. The chief aim laid down there is the reduction of the money cost of distribution; but if the real opportunity cost of using labour is little or nothing, the money cost is a very misleading criterion for policy. This being so, it is difficult to regard the improvement of marketing efficiency as deserving such a high priority as the authors appear to give it. No doubt it would be a desirable thing to bring about so long as it did not involve excessive social disruption; but so long as a surplus of labour persists, it is surely far more important to create employment opportunities that will enable real output to be increased than to raise productivity in a sector of the economy, namely distribution, where real output must be regarded as more or less fixed. Some of the authors' policy recommendations seem rather questionable for this reason, for example, their suggestion that the Development Bank should give up its present practice of confining to industrial purposes only the loans made from its limited resources and instead allow lending to efficient firms engaged in distribution.]

HARRIS (S. E.). New England Textiles and the New England Economy. Report to the Conference of New England Governors. Providence, Rhode Island: Conference of New England Governors, 1956. 11″. Pp. 197.

[This is a report of the New England Governors' Textile Committee, of which Professor Harris is Chairman. It is made up largely of statements which Professor Harris has prepared for various purposes in the course of the past year on different aspects of the problem of New England's textile industries. The basic contention running through the report is that the development of alternative employment opportunities to take the place of the declining textile industries is bound to be slow

and difficult, so that every effort should be made in the meanwhile to keep New England's textile industries viable. A number of suggestions are made of ways in which federal policy might be made to militate less against the interests of New England than it is alleged to do at the present time.]

HAUSER (P. M) and. LEONARD (W. R.) (Eds.). Government Statistics for Business Use. Second edition. New York: John Wiley (London: Chapman & Hall), 1956. 9″. Pp. v + 440. 68*s*.

[The first edition of this book was published in 1946. Each of the fifteen chapters is written by an expert in the particular branch of United States official statistics concerned. The purpose of the volume is to describe the scope of the statistical information made available by the federal government, with particular reference to the needs of management in production and marketing.]

HICKMAN (C. A.) and KUHN (M. H.). Individuals, Groups, and Economic Behavior. New York: The Dryden Press, 1956. 8½″. Pp. vii + 266. $4.75.

[To be reviewed.]

HOGENSON (P. T.). The Economics of Group Banking. Washington, D.C.: Public Affairs Press, 1955. 9½″. Pp. 199. $5.

[Group banking is defined as " the ownership and control of a group of individual banks by a corporate holding company, control of bank shares by a trustee or a group of trustees, or control through a majority ownership of bank shares for investment purposes." It is thus one form, though not the only form, of multiple unit banking in the United States. The usual practice is for the holding company or trustees to acquire practically all of the shares, leaving an insignificant minority interest to enable local men to hold the shares needed to qualify them as directors. The control is nominally in the hands of the directors, so that the bank can be made to appear a local concern, but the directors' freedom of action naturally does not extend in practice to major issues of policy. The system spread a great deal during the late 1920s, and since then it has tended to become less common rather than more so. It remains important, however. Dr. Hogenson describes its development and the way it works. A large part of his book is occupied by a thorough enumeration of the individual group banking systems in existence in different parts of the United States.]

KINDLEBERGER (C. P.). The Terms of Trade. A European case study. New York: John Wiley, and the Technology Press of Massachusetts Institute of Technology (London: Chapman & Hall), 1956. 9½″. Pp. v + 382. 72*s*.

[To be reviewed.]

LEVITT (T.). The Twilight of the Profit Motive. Washington, D.C.: Public Affairs Press, 1955. 9″. Pp. 15. $1.00.

[" There seems to be an inverse relationship between business size and the pervasiveness of the profit motive." This is the central theme of Dr. Levitt's trenchant essay. With the growth in the size of the business unit, salary, not profit, becomes the pecuniary aim of most of those engaged in business. At the same time as the personal interests of business leaders have become transformed in this way, the giant corporations have become obliged to defend their power against hostile criticisms by playing down profits and shifting the emphasis to notions of public service. Other influences lead the same way: the desire to avoid the strains of competition, the fear of stimulating wage demands, the high level of business taxation, all these contribute to weaken the profit motive. The change in practice leads to a change in ethical values, and the all-out pursuit of profit ceases to carry the hallmark of respectability. Dr. Levitt concludes by asking whether this change in values —a change in a direction that has often been sought by social reformers—will or will not destroy the vital impulse of capitalism. He does not give any hint to his own view about the answer to this question.]

MURAD (A.). Private Credit and Public Debt. Washington, D.C.: Public Affairs Press, 1956. 9½″. Pp. 195. $3.75.

[To be reviewed.]

NATIONAL BUREAU OF ECONOMIC RESEARCH. Basic Research and the Analysis of Current Business Conditions, by S. FABRICANT. 36th Annual Report. New York: National Bureau of Economic Research, 1956. 10½″. Pp. 87.

[In his introductory paper Mr. Fabricant illustrates from various aspects of the National Bureau's work the ways in which its established policy of concentrating on research of a basic and general character contributes at the same time to the analysis of current business conditions. The remainder of the report contains the usual full account of the National Bureau's current activities. Much of it is taken up by the extremely useful brief reports from staff members in which they summarise the findings of their investigations to date.]

PATINKIN (D.). Money, Interest and Prices. An integration of monetary and value theory. Evanston, Illinois: Row, Peterson and Co., 1956. 9″. Pp. 510. $7.00.

[To be reviewed.]

Policies to Combat Inflation. A Conference of the Universities-National Bureau Committee for Economic Research. Princeton, New Jersey: Princeton University Press for the National Bureau of Economic Research (London: Geoffrey Cumberlege), 1956. 9½″. Pp. 417. 68*s*.

[To be reviewed.]

POWELL (J. R.). The Mexican Petroleum Industry, 1938–1950. Berkeley and Los Angeles, California: University of California Press (London: Cambridge University Press), 1956. 9½″. Pp. 269. 30*s*.

[The purpose of this book is to examine the objectives of the Mexican Government in expropriating the foreign oil companies in 1938 and to assess the extent to which these objectives had been attained by 1953. The author maintains that the events that led to expropriation can be understood properly only in the light of much earlier history—in particular, the extremely favourable policy towards foreign capital that was adopted under the dictatorship of Porfirio Diaz at the beginning of the present century. Until about 1945 it appeared that the political benefits of expropriation had been achieved at a considerable economic cost. Professor Powell describes the difficulties faced by Pemex—the government agency controlling the oil industry—during this period: the boycott imposed by foreign oil companies, the lack of managerial personnel, and the unreasonable demands of the oil workers, among whom syndicalist tendencies have been strong. Since 1945 a good deal of progress has been made, and by 1950 the position of the industry compared reasonably well with what it had been at the time of expropriation.]

REYNOLDS (L. G.) and TAFT (C. H.). The Evolution of Wage Structure. New Haven, Connecticut: Yale University Press (London: Geoffrey Cumberlege), 1956. 9½″. Pp. 398. 40*s*.

[To be reviewed.]

Ross (W. D.). Financing Highway Improvements in Louisiana. A financial analysis for the Louisiana Legislative Council. Baton Rouge, Louisiana: College of Commerce, Louisiana State University, 1955. 11½″. Pp. 236.

[The author describes the present system of highway finance in Louisiana and makes proposals about the best ways of raising the funds required to carry out the improvements that are considered necessary. These recommendations formed the basis of legislation enacted in Louisiana last year. The section of the report that has the most general interest is Part Three, in which the author discusses how highway costs may be allocated between the general public and different classes of highway users and how highway-user revenues may be allocated between road systems.]

ROUCEK (J. S.) and associates. Social Control. Second edition. Princeton, New Jersey: Van Nostrand (London: Macmillan), 1956. 9½″. Pp. 603. 50*s*.

[The first edition of this introductory text-book was published in 1947. It is a work of collaboration by twenty-seven American sociologists, each of whom contributes one or more chapters. Social control is defined as a collective term for " those processes, planned or unplanned, by which individuals are taught, persuaded, or compelled to conform to the usages and life-values of groups." It thus effectively embraces the whole of sociology, viewed from a particular angle.]

SCHOEFFLER (S.). The Failures of Economics: a Diagnostic Study. Cambridge, Mass.: Harvard University Press, 1955 (London: Geoffrey Cumberlege, 1956). 8¼″. Pp. 254. 38*s*.

[To be reviewed.]

SMITH (E. L.). When to Hold Common Stocks and when to Reduce Holdings. Darien, Connecticut: reproduced for private distribution by the author, 1955. 11″. Pp. 138.

[This is a group of related studies dealing with different aspects of the connection found by the author between stock prices and the weather. The underlying thesis—in itself not an absurd one—is that the weather influences stock prices by its effect on people's state of mind, particularly through its influence on the alkalinity of the blood. A great mass of material relating to stock prices over the last century and a half is adduced in support of this. One of the most novel findings is that weather conditions, and hence stock prices, tend to repeat themselves at intervals of approximately 89½ years. The purpose of these calculations is strictly practical, and the author courageously gives explicit directions about how to use his findings as a guide to investment policy.]

ULMAN (L.). The Rise of the National Trade Union. The development and significance of its structure, governing institutions, and economic policies. Cambridge, Mass.: Harvard University Press, 1955 (London: Geoffrey Cumberlege, 1956). 9½″. Pp. xv + 639. 76*s*.

[To be reviewed.]

United States Agriculture: Perspectives and Prospects. Research reports and background papers prepared for the use of participants in the Seventh American Assembly, Columbia University, New York, May 1955. New York: Graduate School of Business, Columbia University, 1955. 11″. Pp. 124.

[The American Assembly was founded by General Eisenhower when he was president of Columbia University. It is a programme of continuing conferences, supported by a large number of organisations and individuals. The subject of the seventh meeting, held in New York in May 1955, was American Agriculture. The papers in the present volume were prepared as discussion guides for that occasion. They are: "The American Farmer in a Changing World," by Walter W. Wilcox; "Agriculture's Technological Revolution," by Glenn L. Johnson; "The Role of Farm Prices in Agricultural Production," by D. Gale Johnson; "Farm Price and Income Instability," by Harold G. Halcrow; "Surplus Disposal and Domestic Market Expansion," by Geoffrey S. Shepherd; "American Agriculture and Foreign Economic Policy," by O. B. Jesness; "The Low-income Problem in American Agriculture," by W. E. Hendrix; "Improving Rural Community Services," by Wayland J. Hayes; and "Conservation of Agricultural Resources," by Raymond J. Penn and C. W. Loomer.]

French

BOBROWSKI (C.). La Yougoslavie Socialiste. Paris: Armand Colin, 1956. 9½″. Pp. 237. 750 frs.

[This is a sympathetic account of the social and economic development of Yugoslavia since the War. It is preceded by a comparatively lengthy survey of the rise of the present régime during and after the War, and of the famous dispute with Stalin. There follows a discussion of economic policy from the initial ambitious programme of industrialisation to what the author describes as a more balanced policy, in which agriculture plays a highly significant part.]

FOHLEN (C.). Une Affaire de Famille au XIX^{e} Siècle: Méquillet-Noblot. Paris: Armand Colin, 1955. 9½″. Pp. 140. 500 frs.

[M. Fohlen has examined the history of the cotton firm of Méquillet-Noblot from its establishment in 1802 until 1897. The firm, which is a family enterprise, is still in existence. Studies of individual firms are useful for the light which they may cast on the development of the industry as a whole, *e.g.*, the changing specialisation in Méquillet-Noblot reflecting technical and commercial changes. They are useful, also, because they enable the process of business growth to be examined within a comparatively well-defined compass. In the analysis of a family concern, moreover, M. Fohlen has been able to devote considerable attention to the influence of a coherent group of persons.]

JACQUIN (F.). Les Cadres de l'Industrie et du Commerce en France. Paris: Armand Colin, 1955. 10″. Pp. 258. 900 frs.

[M. Jacquin defines "cadre" as "the salaried person responsible for appreciating and setting in operation the whole or part of the policy of the enterprise." This general definition covers something rather more than a mere technician, something less than top management. The author examines, with statistical support and some comparative study of other countries, the background and training of this group in French industry and trade. At the same time, he is concerned to discuss their bargaining problems in the economy. These problems arise, it appears, from the rather special position which the "cadres" occupy between more homogeneous groups.]

German

ERLER (C.). Grundprobleme des Internationalen Wirtschaftsrechts. Gottingen: Otto Schwartz, 1956. 9″. Pp. 215. DM. 19.80.

[The growth in recent years of international economic organisations, such as G.A.T.T. and O.E.E.C., has naturally been accompanied by problems in international law that have little in common with pre-war experience. This work examines these problems against the general background of international mercantile law, and suggests the directions in which future developments may lie.]

IRAQI

SALTER (LORD). The Development of Iraq. A plan of action. Baghdad: Iraq Development Board, 1955. 8½″. Pp. 252. 29*s*. including postage.

[The difficulties of drawing up an economic development plan for Iraq are, at least on paper, a good deal less formidable than for most underdeveloped countries. Iraq possesses large areas of potentially fertile soil, there is at present no population problem, and, above all, oil royalties provide a source of capital and of foreign exchange. The purpose of the report that Lord Salter was invited to make is to outline an immediate programme rather than to survey the economic problems of the country in broad long-range terms. Much of the report is therefore taken up with matters of detail. On the general problem of the desirable shape of the national economy, Lord Salter shares the view put forward previously by the World Bank Mission and by Professor Iversen that in the present circumstances the improvement of agriculture (including improved use and control of water supply) is much more urgent and practicable than the development of industry. He attaches great importance to improving the standard of administration and to increasing the supply of skilled and professional man-power. A fair number of the author's recommendations are not new, but, as he explains, the Iraqi authorities have hitherto been more ready to seek the advice of foreign experts than to act upon it. Many proposals put forward in the past therefore still remain to be implemented.]

INTERNATIONAL

BANK FOR INTERNATIONAL SETTLEMENTS. Twenty-sixth Annual Report. Basle: Bank for International Settlements, 1956. 12″. Pp. 230.

[In addition to its usual survey of economic developments during the year, the present issue of this report contains a long special chapter on the scope of monetary policy as illustrated by recent experience. The Bank for International Settlements is well known as a champion of monetary policy, and the report finds much to support this attitude in the events of the last few years. It is admitted, however, that monetary policy is not adequate by itself to control inflation and that it needs to be supported not merely by the appropriate fiscal policy but also by a sense of responsibility among business and trade-union leaders.]

COUNCIL OF EUROPE. Focus on East–West Relations. A policy for Europe. Strasbourg: Council of Europe, 1956. 10½″. Pp. 252.

[This contains a verbatim record of the policy debates of the Consultative Assembly of the Council of Europe held in July and October 1955. The related working papers are also included.]

EUROPEAN PAYMENTS UNION. Fifth Annual Report of the Managing Board, for the Financial Year, 1954–55. Paris: Organisation for European Economic Co-operation, 1956. 9½″. Pp. 73, and annexes. 6*s*.

[In addition to describing the activities of the E.P.U. during the year and the plans made for the year ending June 30, 1956, this report contains a survey chapter describing the evolution of the payments system between European countries since the War.]

ORGANISATION FOR EUROPEAN ECONOMIC CO-OPERATION. 7th Report. Economic Expansion and its Problems. Paris: Organisation for European Economic Co-operation, 1956. 9½″. Pp. 298. 7*s*.

[Part I surveys the present economic situation and problems of Europe in general terms. Part II, which occupies the bulk of the report, describes developments in individual countries.]

UNITED NATIONS. Yearbook of the United Nations, 1954. New York: United Nations, 1955. 10″. Pp. 656. 70*s*.

[This work of reference describes the activities of the United Nations and its specialised agencies in the course of the year. It is made up largely of brief accounts of the public deliberations of the bodies concerned and summaries of the United Nations publications connected with them.]

UNITED NATIONS. Demographic Yearbook 1955. Seventh issue. New York: United Nations, 1956. 11½″. Pp. 781. 50*s*.

[In accordance with the established practice of featuring one special class of demographic statistics in each year's issue, the present edition of this yearbook is largely devoted to the results of national population censuses taken between 1945 and 1954. About a third of the volume is taken up with data on the size of population in different countries, regions and towns, and a further substantial section deals with age and sex distribution. Tables relating to economic characteristics of populations occupy another hundred or so pages. In addition to this material derived from censuses, the yearbook also gives up-to-date figures of births, deaths, marriages, divorces and life tables.]

UNITED NATIONS. Statistical Yearbook 1955. Prepared by the Statistical Office of the United Nations Department of Economic and Social Affairs. New York: United Nations, 1955. 11½". Pp. 644. 40*s*.

[The scope and arrangement of the seventh issue of this *Yearbook* are similar to former years, but the greater availability of information has led to a substantial enlargement in size and coverage. The government of the U.S.S.R. has for the first time collaborated by furnishing data.]

UNITED NATIONS FOOD AND AGRICULTURE ORGANISATION. Agriculture in the World Economy. Rome: F.A.O., 1956. 9". Pp. 76. 5*s*.

[This is a general survey in fairly elementary terms of the present state of world agriculture. Well-designed charts show the leading statistics. The authors emphasise the need to expand agricultural production to keep pace with the growth of population, and they attach importance also to raising agricultural income per head so that it no longer falls below income in other sectors in the way it regularly does at present.]

UNITED NATIONS FOOD AND AGRICULTURE ORGANISATION. Functions of a World Food Reserve—Scope and Limitations. F.A.O. Commodity Policy Studies, No. 10. Rome: F.A.O., 1956. 11". Pp. 77. 5*s*.

[Part I of this report is a general review of the functions of a world food reserve. Three main functions are considered: famine and other emergency relief, price stabilisation, and the establishment of a world food capital fund to assist in the economic development of backward countries. It is pointed out that the latter two functions, while by no means inconsistent with each other, are of a very different character and could probably not both be conveniently exercised by the same authority. Part II provides a chronological survey of relevant inter-governmental consultations and actions in recent years. The author of the report is Dr. Gerda Blau.]

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